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(54) METHOD AND DEVICE FOR CONTROLLING DATA TRANSMISSION, AND BASE STATION

(57) The present invention discloses a data transmission control method and relates to the field of communications technologies. According to the method, HSDPA data is actively retransmitted on a network side, and an HARQ combination gain is used to improve a data receiving success rate of a cell edge, thereby improving a network coverage effect and resolving a problem of call drop of user equipment. This solution is mainly applied to an HSDPA network scenario, and may also be applied to another 3G or 4G mobile network.

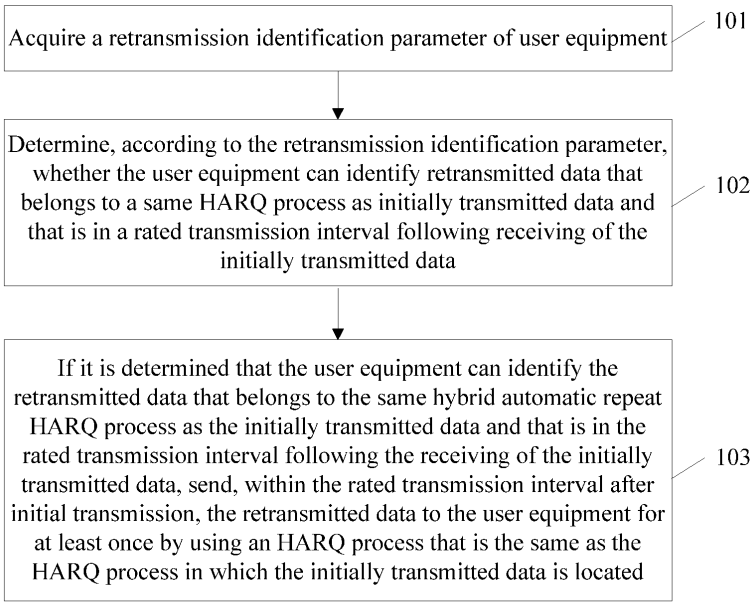

FIG. 1

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Description

TECHNICAL FIELD

[0001] The present invention relates to the field of communications technologies, and in particular, to a data transmission control method and apparatus, and a base station.

BACKGROUND

[0002] HSDPA (High Speed Downlink Packet Access, High Speed Downlink Packet Access) is a mobile communications protocol, and the protocol provides a packet data service in a WCDMA (Wideband Code Division Multiple Access, Wideband Code Division Multiple Access) downlink and is an important new feature of the third generation wireless communications standard WCDMA. A basic idea of the protocol is to establish a high speed shared transmission channel to improve a data transmission rate, thereby providing a maximum downlink throughput rate for a system.

[0003] As a key technology of the HSDPA, SRB (Signaling Radio Bearers, signaling radio bearer) Over HSDPA can improve a downlink capacity of a future wireless air interface. In LTE (Long Term Evolution, Long Term Evolution), as a special radio bearer (RB), an SRB can be used to transmit an RRC (Radio Resource Control, radio resource control) message and a NAS (Non-Access Stratum, non-access stratum) message, so that a network side can send data to user equipment that can perform normal receiving, to complete interaction, so as to ensure that the user equipment and the network side are kept connected.

[0004] However, because the 3GPP (3rd Generation Partnership Project, 3rd Generation Partnership Project) protocol specifies that the HSPDA can use only hard handover to complete session handover of the user equipment, which causes an extremely high call drop rate in a cell edge area and an extremely small capacity of a cell coverage edge.

SUMMARY

[0005] Embodiments of the present invention provide a data transmission control method and apparatus, and a base station, which can improve a data receiving success rate of a cell edge, thereby improving a network coverage effect.

[0006] To achieve the foregoing objective, the following technical solutions are adopted in the embodiments of the present invention:

According to a first aspect, an embodiment of the present invention provides a data transmission control method, including:

acquiring a retransmission identification parameter of user equipment;

determining, according to the retransmission identification parameter, whether the user equipment can identify retransmitted data that belongs to a same hybrid automatic repeat HARQ (Hybrid Automatic Repeat Request, hybrid automatic repeat request) process as initially transmitted data and that is in a rated transmission interval following receiving of the initially transmitted data; and

if it is determined that the user equipment can identify the retransmitted data that belongs to the same hybrid automatic repeat HARQ process as the initially transmitted data and that is in the rated transmission interval following the receiving of the initially transmitted data, sending, within the rated transmission interval after initial transmission, the retransmitted data to the user equipment for at least once by using an HARQ process that is the same as the HARQ process in which the initially transmitted data is located.

[0007] With reference to the first aspect, in a first possible implementation manner of the first aspect, when the retransmission identification parameter is identification information of a retransmission identification capability, the acquiring a retransmission identification parameter of user equipment includes:

acquiring identification information of a retransmission identification capability of the user equipment, where the identification information of the retransmission identification capability is used to indicate whether the user equipment can identify the retransmitted data that belongs to the same HARQ process as the initially transmitted data and that is in the rated transmission interval following the receiving of the initially transmitted data; and

the determining, according to the retransmission identification parameter, whether the user equipment can identify retransmitted data that belongs to a same HARQ process as initially transmitted data and that is in a rated transmission interval following receiving of the initially transmitted data includes:

if the identification information of the retransmission identification capability indicates that the user equipment can identify the retransmitted data that belongs to the same HARQ process as the initially transmitted data and that is in the rated transmission interval following the receiving of the initially transmitted data, determining that the user equipment can identify the retransmitted data that belongs to the same HARQ process as the initially transmitted data and that is in the rated transmission interval following the receiving of the initially transmitted data; or

if the identification information of the retransmission identification capability indicates that the user equipment cannot identify the retransmitted data that belongs to the same HARQ process as the initially transmitted data and that is in the rated transmission interval following the receiving of the initially transmitted data, determining that the user equipment cannot identify the retransmitted data that belongs to the same HARQ process as the initially transmitted data and that is in the rated transmission interval following the receiving of the initially transmitted data.

[0008] With reference to the first aspect, in a second possible implementation manner of the first aspect, when the retransmission identification parameter is a device identifier, the acquiring a retransmission identification parameter of user equipment includes:

acquiring a device identifier of the user equipment; and

the determining, according to the retransmission identification parameter, whether the user equipment can identify retransmitted data that belongs to a same HARQ process as initially transmitted data and that is in a rated transmission interval following receiving of the initially transmitted data includes:

determining, according to the device identifier of the user equipment and an association relationship between a device identifier and a retransmission identification capability, a retransmission identification capability corresponding to the device identifier of the user equipment; and

if the retransmission identification capability corresponding to the device identifier of the user equipment is that the user equipment can identify the retransmitted data that belongs to the same HARQ process as the initially transmitted data and that is in the rated transmission interval following the receiving of the initially transmitted data, determining that the user equipment can identify the retransmitted data that belongs to the same HARQ process as the initially transmitted data and that is in the rated transmission interval following the receiving of the initially transmitted data;

if the retransmission identification capability corresponding to the device identifier of the user equipment is that the user equipment cannot identify the retransmitted data that belongs to the same HARQ process as the initially transmitted data and that is in the rated transmission interval following the receiving of the initially transmitted data, determining that the user equipment cannot identify the retransmitted data that belongs to the same HARQ process as the initially transmitted data and that is in the rated transmission interval following the receiving of the initially transmitted data; or

if the retransmission identification capability corresponding to the device identifier of the user equipment cannot be determined according to the association relationship between a device identifier and a retransmission identification capability, determining that the user equipment cannot identify the retransmitted data that belongs to the same HARQ process as the initially transmitted data and that is in the rated transmission interval following the receiving of the initially transmitted data.

[0009] With reference to the first aspect, in a third possible implementation manner of the first aspect, when the retransmission identification parameter is a feedback status, the acquiring a retransmission identification parameter of user equipment includes:

sending, within the rated transmission interval after the initial transmission, the retransmitted data to the user equipment for at least once by using the HARQ process that is the same as the HARQ process in which the initially transmitted data is located;

collecting a feedback status of a user terminal in a terminal receiving status feedback period that is after the retransmitted data is sent; and the determining, according to the retransmission identification parameter, whether the user equipment can identify retransmitted data that belongs to a same HARQ process as initially transmitted data and that is in a rated transmission interval following receiving of the initially transmitted data includes:

determining, according to the feedback status of the user terminal, whether the user equipment can identify the retransmitted data that belongs to the same HARQ process as the initially transmitted data and that is in the rated transmission interval following the receiving of the initially transmitted data, wherein

if the feedback status of the user terminal is discontinuous transmission DTX, determining that the user equipment cannot identify the retransmitted data that belongs to the same HARQ process as the initially transmitted data and that is in the rated transmission interval following the receiving of initially transmitted data; or

if the feedback status of the user terminal is a receiving success ACK or a receiving failure NACK, determining that the user equipment can identify the retransmitted data that belongs to the same HARQ process as the initially transmitted data and that is in the rated transmission interval following the receiving of initially transmitted data.

[0010] With reference to the first aspect or any one of the first three possible implementation manners of the first aspect, in a fourth possible implementation manner of the first aspect, the method further includes:

if it is determined that the user equipment cannot identify the retransmitted data that belongs to the same HARQ process as the initially transmitted data and that is in the rated transmission interval following the receiving of initially transmitted data, sending, within the rated transmission interval after the initial transmission, the initially transmitted data for at least once by using another HARQ process that is different from the HARQ process in which the initially transmitted data is located.

[0011] With reference to the fourth possible implementation manner of the first aspect, in a fifth possible implementation manner of the first aspect, the sending, within the rated transmission interval after the initial transmission, the initially transmitted data for at least once by using another HARQ process that is different from the HARQ process in which the initially transmitted data is located includes:

if the initially transmitted data is sent, within the rated transmission interval after the initial transmission, for only once by using the another HARQ process that is different from the HARQ process in which the initially transmitted data is located, sending, within the rated transmission interval after the initial transmission, the initially transmitted data by using the another HARQ process that is different from the HARQ process in which the initially transmitted data is located; or

if the initially transmitted data is sent, within the rated transmission interval after the initial transmission, for at least twice by using the another HARQ process that is different from the HARQ process in which the initially transmitted data is located, resending, within the rated transmission interval after the initial transmission, the initially transmitted data for the first time by using the another HARQ process that is different from the HARQ process in which the initially transmitted data is located, and resending the initially transmitted data for the $(N+1)^{th}$ time by using still another HARQ process that is different from the HARQ process in which the initially transmitted data is located and HARQ processes in which retransmitted data retransmitted for the first N times is located, where N is an integer greater than 1.

[0012] With reference to the first aspect or any one of the first five possible implementation manners of the first aspect, in a sixth possible implementation manner of the first aspect, the rated transmission interval is five TTIs (Transmission Time Interval, transmission time interval) or seven TTIs.

[0013] According to a second aspect, an embodiment of the present invention provides a data transmission control apparatus, including:

an acquiring unit, configured to acquire a retransmission identification parameter of user equipment;
a determining unit, configured to determine, according to the retransmission identification parameter, whether the user equipment can identify retransmitted data that belongs to a same HARQ process as initially transmitted data and that is in a rated transmission interval following receiving of the initially transmitted data; and
a transmitting unit, configured to: when the user equipment can identify the retransmitted data that belongs to the same hybrid automatic repeat HARQ process as the initially transmitted data and that is in the rated transmission interval following the receiving of the initially transmitted data, send, within the rated transmission interval after initial transmission, the retransmitted data to the user equipment for at least once by using an HARQ process that is the same as the HARQ process in which the initially transmitted data is located.

[0014] With reference to the second aspect, in a first possible implementation manner of the second aspect, the acquiring unit is specifically configured to: when the retransmission identification parameter is identification information of a retransmission identification capability, acquire identification information of a retransmission identification capability of the user equipment, where the identification information of the retransmission identification capability is used to indicate whether the user equipment can identify the retransmitted data that belongs to the same HARQ process as the initially transmitted data and that is in the rated transmission interval following the receiving of the initially transmitted data; and

the determining unit is specifically configured to: when the identification information of the retransmission identification capability indicates that the user equipment can identify the retransmitted data that belongs to the same HARQ process as the initially transmitted data and that is in the rated transmission interval following the receiving of the initially transmitted data, determine that the user equipment can identify the retransmitted data that belongs to the same HARQ process as the initially transmitted data and that is in the rated transmission interval following the receiving of the initially transmitted data; or when the identification information of the retransmission identification capability indicates that the user equipment cannot identify the retransmitted data that belongs to the same HARQ process as the initially transmitted data and that is in the rated transmission interval following the receiving of the initially transmitted data, determine that the user equipment can-

not identify the retransmitted data that belongs to the same HARQ process as the initially transmitted data and that is in the rated transmission interval following the receiving of the initially transmitted data.

[0015] With reference to the second aspect, in a second possible implementation manner of the second aspect, the acquiring unit is further specifically configured to acquire a device identifier of the user equipment; and

the determining unit is further specifically configured to: determine, according to the device identifier of the user equipment and an association relationship between a device identifier and a retransmission identification capability, a retransmission identification capability corresponding to the device identifier of the user equipment; and if the retransmission identification capability corresponding to the device identifier of the user equipment is that the user equipment can identify the retransmitted data that belongs to the same HARQ process as the initially transmitted data and that is in the rated transmission interval following the receiving of the initially transmitted data, determine that the user equipment can identify the retransmitted data that belongs to the same HARQ process as the initially transmitted data and that is in the rated transmission interval following the receiving of the initially transmitted data; if the retransmission identification capability corresponding to the device identifier of the user equipment is that the user equipment cannot identify the retransmitted data that belongs to the same HARQ process as the initially transmitted data and that is in the rated transmission interval following the receiving of the initially transmitted data, determine that the user equipment cannot identify the retransmitted data that belongs to the same HARQ process as the initially transmitted data and that is in the rated transmission interval following the receiving of the initially transmitted data; or if the retransmission identification capability corresponding to the device identifier of the user equipment cannot be determined according to the association relationship between a device identifier and a retransmission identification capability, determine that the user equipment cannot identify the retransmitted data that belongs to the same HARQ process as the initially transmitted data and that is in the rated transmission interval following the receiving of the initially transmitted data.

[0016] With reference to the second aspect, in a third possible implementation manner of the second aspect, the acquiring unit further includes a transmitting module and a collecting module, where

the transmitting module is configured to send, within the rated transmission interval after the initial transmission, the retransmitted data to the user equipment for at least once by using the HARQ process that is the same as the HARQ process in which the initially transmitted data is located;

the collecting module is configured to collect a feedback status of a user terminal in a terminal receiving status feedback period that is after the retransmitted data is sent; and

the determining unit is further configured to: determine, according to the feedback status of the user terminal, whether the user equipment can identify the retransmitted data that belongs to the same HARQ process as the initially transmitted data and that is in the rated transmission interval following the receiving of the initially transmitted data, wherein if the feedback status of the user terminal is discontinuous transmission DTX, the determining unit determines that the user equipment cannot identify the retransmitted data that belongs to the same HARQ process as the initially transmitted data and that is in the rated transmission interval following the receiving of initially transmitted data; or if the feedback status of the user terminal is a receiving success ACK or a receiving failure NACK, the determining unit determines that the user equipment can identify the retransmitted data that belongs to the same HARQ process as the initially transmitted data and that is in the rated transmission interval following the receiving of initially transmitted data.

[0017] With reference to the second aspect or any one of the first three possible implementation manners of the second aspect, in a fourth possible implementation manner of the second aspect, the transmitting unit is further configured to: when it is determined that the user equipment cannot identify the retransmitted data that belongs to the same HARQ process as the initially transmitted data and that is in the rated transmission interval following the receiving of initially transmitted data, send, within the rated transmission interval after the initial transmission, the initially transmitted data for at least once by using another HARQ process that is different from the HARQ process in which the initially transmitted data is located.

[0018] With reference to the fourth possible implementation manner of the second aspect, in a fifth possible implementation manner of the second aspect, the transmitting unit is further specifically configured to: when the initially transmitted data is sent, within the rated transmission interval after the initial transmission, for only once by using the another HARQ process that is different from the HARQ process in which the initially transmitted data is located, send, within the rated transmission interval after the initial transmission, the initially transmitted data by using the another HARQ process that is different from the HARQ process in which the initially transmitted data is located; or when the initially transmitted data is sent, within the rated transmission interval after the initial transmission, for at least twice by using the another HARQ process that is different from the HARQ process

in which the initially transmitted data is located, resend, within the rated transmission interval after the initial transmission, the initially transmitted data for the first time by using the another HARQ process that is different from the HARQ process in which the initially transmitted data is located, and resend the initially transmitted data for the $(N+1)^{th}$ time by using still another HARQ process that is different from the HARQ process in which the initially transmitted data is located and HARQ processes in which retransmitted data retransmitted for the first N times is located, where N is an integer greater than 1.

[0019] With reference to the second aspect or any one of the first five possible implementation manners of the second aspect, in a sixth possible implementation manner of the second aspect, the rated transmission interval is five TTIs or seven TTIs.

[0020] According to a third aspect, an embodiment of the present invention provides a base station, including a processor, a memory, and a transceiver; where the memory stores at least a computer program; the processor is configured to invoke the program stored in the memory, so as to control the transceiver; and the processor, the memory, and the transceiver perform communication by using a bus; where

the processor is configured to: acquire a retransmission identification parameter of user equipment, and determine, according to the retransmission identification parameter, whether the user equipment can identify retransmitted data that belongs to a same HARQ process as initially transmitted data and that is in a rated transmission interval following receiving of the initially transmitted data; and

the transceiver is configured to: when it is determined that the user equipment can identify the retransmitted data that belongs to the same hybrid automatic repeat HARQ process as the initially transmitted data and that is in the rated transmission interval following the receiving of the initially transmitted data, send, within the rated transmission interval after initial transmission, the retransmitted data to the user equipment for at least once by using an HARQ process that is the same as the HARQ process in which the initially transmitted data is located.

[0021] With reference to the third aspect, in a first possible implementation manner of the third aspect, the processor is further specifically configured to: when the retransmission identification parameter is identification information of a retransmission identification capability, acquire identification information of a retransmission identification capability of the user equipment, where the identification information of the retransmission identification capability is used to indicate whether the user equipment can identify the retransmitted data that belongs to the same HARQ process as the initially transmitted data and that is in the rated transmission interval following the receiving of the initially transmitted data; and if the identification information of the retransmission identification capability indicates that the user equipment can identify the retransmitted data that belongs to the same HARQ process as the initially transmitted data and that is in the rated transmission interval following the receiving of the initially transmitted data, determine that the user equipment can identify the retransmitted data that belongs to the same HARQ process as the initially transmitted data and that is in the rated transmission interval following the receiving of the initially transmitted data; or if the identification information of the retransmission identification capability indicates that the user equipment cannot identify the retransmitted data that belongs to the same HARQ process as the initially transmitted data and that is in the rated transmission interval following the receiving of the initially transmitted data, determine that the user equipment cannot identify the retransmitted data that belongs to the same HARQ process as the initially transmitted data and that is in the rated transmission interval following the receiving of the initially transmitted data.

[0022] With reference to the third aspect, in a second possible implementation manner of the third aspect, the processor is further specifically configured to: when the retransmission identification parameter is a device identifier, acquire a device identifier of the user equipment; determine, according to the device identifier of the user equipment and an association relationship between a device identifier and a retransmission identification capability, a retransmission identification capability corresponding to the device identifier of the user equipment; and if the retransmission identification capability corresponding to the device identifier of the user equipment is that the user equipment can identify the retransmitted data that belongs to the same HARQ process as the initially transmitted data and that is in the rated transmission interval following the receiving of the initially transmitted data, determine that the user equipment can identify the retransmitted data that belongs to the same HARQ process as the initially transmitted data and that is in the rated transmission interval following the receiving of the initially transmitted data; if the retransmission identification capability corresponding to the device identifier of the user equipment is that the user equipment cannot identify the retransmitted data that belongs to the same HARQ process as the initially transmitted data and that is in the rated transmission interval following the receiving of the initially transmitted data, determine that the user equipment cannot identify the retransmitted data that belongs to the same HARQ process as the initially transmitted data and that is in the rated transmission interval following the receiving of the initially transmitted data; or if the retransmission identification capability corresponding to the device identifier of the user equipment cannot be determined according to the association relationship between a device identifier and a retransmission identification capability, determine that the user equipment cannot identify the retransmitted data that belongs to the same HARQ process as the initially transmitted data and

that is in the rated transmission interval following the receiving of the initially transmitted data.

[0023] With reference to the third aspect, in a third possible implementation manner of the third aspect, the transceiver is further configured to send, within the rated transmission interval after the initial transmission, the retransmitted data to the user equipment for at least once by using the HARQ process that is the same as the HARQ process in which the initially transmitted data is located; and

the processor is further configured to: collect a feedback status of a user terminal in a terminal receiving status feedback period that is after the retransmitted data is sent; and determine, according to the feedback status of the user terminal, whether the user equipment can identify the retransmitted data that belongs to the same HARQ process as the initially transmitted data and that is in the rated transmission interval following the receiving of the initially transmitted data, wherein if the feedback status of the user terminal is discontinuous transmission DTX, the processor determines that the user equipment cannot identify the retransmitted data that belongs to the same HARQ process as the initially transmitted data and that is in the rated transmission interval following the receiving of initially transmitted data; or if the feedback status of the user terminal is a receiving success ACK or a receiving failure NACK, the processor determines that the user equipment can identify the retransmitted data that belongs to the same HARQ process as the initially transmitted data and that is in the rated transmission interval following the receiving of initially transmitted data.

[0024] With reference to the third aspect or any one of the first three possible implementation manners of the third aspect, in a fourth possible implementation manner of the third aspect, the transceiver is further specifically configured to: if it is determined that the user equipment cannot identify the retransmitted data that belongs to the same HARQ process as the initially transmitted data and that is in the rated transmission interval following the receiving of initially transmitted data, send, within the rated transmission interval after the initial transmission, the initially transmitted data for at least once by using another HARQ process that is different from the HARQ process in which the initially transmitted data is located.

[0025] With reference to the fourth possible implementation manner of the third aspect, in a fifth possible implementation manner of the third aspect, the transceiver is further specifically configured to: if the initially transmitted data is sent, within the rated transmission interval after the initial transmission, for only once by using the another HARQ process that is different from the HARQ process in which the initially transmitted data is located, send, within the rated transmission interval after the initial transmission, the initially transmitted data by using the another HARQ process that is different from the HARQ process in which the initially transmitted data is located; or if the initially transmitted data is sent, within the rated transmission interval after the initial transmission, for at least twice by using the another HARQ process that is different from the HARQ process in which the initially transmitted data is located, resend, within the rated transmission interval after the initial transmission, the initially transmitted data for the first time by using the another HARQ process that is different from the HARQ process in which the initially transmitted data is located, and resend the initially transmitted data for the $(N+1)^{th}$ time by using still another HARQ process that is different from the HARQ process in which the initially transmitted data is located and HARQ processes in which retransmitted data retransmitted for the first N times is located, where N is an integer greater than 1.

[0026] With reference to the third aspect or any one of the first five possible implementation manners of the third aspect, in a sixth possible implementation manner of the third aspect, the rated transmission interval is five TTIs or seven TTIs.

[0027] According to the data transmission control method and apparatus, and the base station that are provided in the embodiments of the present invention, after it is determined that user equipment can identify data that is retransmitted for several times in a short period of time, retransmitted data is sent, within a rated transmission interval after initial transmission, to the user equipment for at least once by using an HARQ process that is the same as an HARQ process in which initially transmitted data is located, so that the user equipment can obtain, in the short period of time, a combination gain generated during data demodulation, which greatly improves accuracy of receiving, by the user equipment, data sent by the base station; therefore, a relatively remote position covered by a cell can still quickly obtain information about the base station, thereby preventing, to some extent, a case of call drop caused by hard handover and further improving a cell capacity.

BRIEF DESCRIPTION OF DRAWINGS

[0028] To describe the technical solutions in the embodiments of the present invention or in the prior art more clearly, the following briefly introduces the accompanying drawings required for describing the embodiments or the prior art. Apparently, the accompanying drawings in the following description show merely some embodiments of the present invention, and a person of ordinary skill in the art may still derive other drawings from these accompanying drawings without creative efforts.

FIG. 1 is a flowchart of a data transmission control method according to an embodiment of the present invention;

FIG. 2 is a flowchart of another data transmission control method according to an embodiment of the

present invention;

FIG. 3 is a flowchart of another data transmission control method according to an embodiment of the present invention;

FIG. 4 is a flowchart of another data transmission control method according to an embodiment of the present invention;

FIG. 5 is a flowchart of another data transmission control method according to an embodiment of the present invention;

FIG. 6 is a composition block diagram of a data transmission control apparatus according to an embodiment of the present invention;

FIG. 7 is a composition block diagram of another data transmission control apparatus according to an embodiment of the present invention; and

FIG. 8 is a composition block diagram of a base station according to an embodiment of the present invention.

DESCRIPTION OF EMBODIMENTS

[0029] The following clearly and completely describes the technical solutions in the embodiments of the present invention with reference to the accompanying drawings in the embodiments of the present invention. Apparently, the described embodiments are merely some but not all of the embodiments of the present invention. All other embodiments obtained by a person of ordinary skill in the art based on the embodiments of the present invention without creative efforts shall fall within the protection scope of the present invention.

[0030] A data transmission control method provided in this embodiment of the present invention is applied to data transmission control in a mobile communications network, which mainly relates to retransmission information exchange between a base station and user equipment, and is preferably used in a scenario of SRB over HSDPA.

[0031] In addition, it should be noted that a data retransmission manner provided in the technical solution of the present invention may be used in parallel with a data retransmission manner specified in an existing protocol standard, and the base station may select, by itself, one manner according to a need, so as to implement data retransmission.

[0032] The method is mainly performed by a base station side, and a method procedure is shown in FIG. 1, which specifically includes the following steps:

101. Acquire a retransmission identification parameter of user equipment.

The retransmission identification parameter may include identification information of a retransmission identification capability of the user equipment or a device identifier of the user equipment, or may be feedback information indicating whether data sent by a base station can be received, where the identification information of the retransmission identification capability may be a field identifier, a field that can be used to carry a function description, or the like, and the device identifier refers to a device model, a device code, or the like.

102. Determine, according to the retransmission identification parameter, whether the user equipment can identify retransmitted data that belongs to a same HARQ process as initially transmitted data and that is in a rated transmission interval following receiving of the initially transmitted data.

The rated transmission interval in this embodiment of the present invention is set to five TTIs or seven TTIs, where the five TTIs may be applied to a WCDMA network standard, and the seven TTIs may be applied to an LTE network standard. Five TTIs or seven TTIs are an optional setting provided in this embodiment of the present invention, and the rated transmission interval may also be set to another quantity of TTIs according to an actual need. In another network standard, this parameter value may be set separately according to a need.

A specific identification method with reference to the identification information of the retransmission identification capability or the device identifier is described in detail in a subsequent part of the embodiments of the present invention.

103. If it is determined that the user equipment can identify the retransmitted data that belongs to the same hybrid automatic repeat HARQ process as the initially transmitted data and that is in the rated transmission interval following the receiving of the initially transmitted data, send, within the rated transmission interval after initial transmission, the retransmitted data to the user equipment for at least once by using an HARQ process that is the same as the HARQ process in which the initially transmitted data is located. In this embodiment of the present invention, once the base station determines that the user equipment can support identification of data that is in the same HARQ process and that is continuously retransmitted in a short period of time, the base station can actively retransmit the data to the user equipment, and does not need to wait for any information feedback from the user equipment.

[0033] According to the data transmission control method provided in this embodiment of the present invention, after it is determined that user equipment can identify data that is retransmitted for several times in a short period of time, retransmitted data is sent, within a rated transmission interval after initial transmission, to the user equipment for at least once by using an HARQ process that is the same as an HARQ process in which initially transmitted data is located, so that the user equipment can obtain, in the short period of time, a combination gain generated during data demodulation, which greatly improves accuracy of receiving, by the user equipment,

data sent by a base station; therefore, a relatively remote position covered by a cell can still quickly obtain information about the base station, thereby preventing, to some extent, a case of call drop caused by hard handover and further improving a cell capacity.

[0034] In a possible implementation manner of this embodiment of the present invention, for a case in which the retransmission identification parameter is identification information of a retransmission identification capability of user equipment, a method for determining the identification capability of the user equipment is provided; as shown in FIG. 2, the method includes the following steps:

201. Acquire identification information of a retransmission identification capability of user equipment.

The identification information of the retransmission identification capability is used to indicate whether the user equipment can identify retransmitted data that belongs to a same HARQ process as initially transmitted data and that is in a rated transmission interval following receiving of the initially transmitted data. Generally, the identification may be implemented by setting a flag bit on a specific field of a piece of specific transmission information or a specific transmission command; when the flag bit is 1, it indicates that the identification information of the retransmission identification capability indicates that the user equipment can identify the retransmitted data that belongs to the same HARQ process as the initially transmitted data and that is in the rated transmission interval following the receiving of the initially transmitted data; when the flag bit is 0, it indicates that the identification information of the retransmission identification capability indicates that the user equipment cannot identify the retransmitted data that belongs to the same HARQ process as the initially transmitted data and that is in the rated transmission interval following the receiving of the initially transmitted data. Certainly, meanings represented by 0 and 1 may also be exchanged.

202. If the identification information of the retransmission identification capability indicates that the user equipment can identify retransmitted data that belongs to a same HARQ process as initially transmitted data and that is in a rated transmission interval following receiving of the initially transmitted data, determine that the user equipment can identify the retransmitted data that belongs to the same HARQ process as the initially transmitted data and that is in the rated transmission interval following the receiving of the initially transmitted data.

203. If the identification information of the retransmission identification capability indicates that the user equipment cannot identify retransmitted data that belongs to a same HARQ process as initially transmitted data and that is in a rated transmission interval following receiving of the initially transmitted data, determine that the user equipment cannot identify the retransmitted data that belongs to the same HARQ process as the initially transmitted data and that is in the rated transmission interval following the receiving of the initially transmitted data.

[0035] The identification information of the retransmission identification capability may be acquired in the following way: a base station sends a request to the user equipment to request the user equipment to actively report the identification information of the retransmission identification capability; if the user equipment has the retransmission identification capability but does not report the identification information of the retransmission identification capability, or the user equipment cannot report the identification information of the retransmission identification capability due to lack of the retransmission identification capability, it may be considered that the identification information of the retransmission identification capability of the user equipment cannot be acquired.

[0036] In this implementation manner, a base station identifies a capability of user equipment by using identification information of a retransmission identification capability, which can improve accuracy of identifying the capability of the user equipment by the base station.

[0037] In another possible implementation manner of this embodiment of the present invention, in a case in which the retransmission identification parameter is a device identifier of user equipment, a method for determining a retransmission identification capability corresponding to the device identifier of the user equipment is provided; as shown in FIG. 3, the method includes the following steps:

301. Acquire a device identifier of user equipment.

302. Determine, according to the device identifier of the user equipment and an association relationship between a device identifier and a retransmission identification capability, a retransmission identification capability corresponding to the device identifier of the user equipment. According to different determining results, any one of steps 303 to 305 may be performed subsequently.

The association relationship between a device identifier and a retransmission identification capability may be preset, and a specific quantity of device identifiers and corresponding retransmission identification capabilities need to be acquired according to an actual need, so as to establish the association relationship, where the association relationship may be stored, in a list manner or the like, in a base station or a device (such as a radio network controller RNC) that can directly communicate with the base station, and an operation, such as updating, adding, or deleting, may be performed according to a need.

303. If the retransmission identification capability corresponding to the device identifier of the user equipment is that the user equipment can identify

retransmitted data that belongs to a same HARQ process as initially transmitted data and that is in a rated transmission interval following receiving of the initially transmitted data, determine that the user equipment can identify the retransmitted data that belongs to the same HARQ process as the initially transmitted data and that is in the rated transmission interval following the receiving of the initially transmitted data.

304. If the retransmission identification capability corresponding to the device identifier of the user equipment is that the user equipment cannot identify retransmitted data that belongs to a same HARQ process as initially transmitted data and that is in a rated transmission interval following receiving of the initially transmitted data, determine that the user equipment cannot identify the retransmitted data that belongs to the same HARQ process as the initially transmitted data and that is in the rated transmission interval following the receiving of the initially transmitted data.

305. If the retransmission identification capability corresponding to the device identifier of the user equipment cannot be determined according to the association relationship between a device identifier and a retransmission identification capability, determine that the user equipment cannot identify retransmitted data that belongs to a same HARQ process as initially transmitted data and that is in a rated transmission interval following receiving of the initially transmitted data.

[0038] If the device identifier of the to-be-identified user equipment or the retransmission identification capability of the to-be-identified user equipment does not appear in the association relationship list, it may be considered that the retransmission identification capability corresponding to the device identifier of the user equipment cannot be determined.

[0039] In this implementation manner, because a device identifier of user equipment is provided to a base station side during network access and registration of the user equipment or in another procedure of exchange with a base station, if a retransmission identification capability of the user equipment can be directly determined according to the device identifier, the procedure of exchange with the user equipment can be omitted. Compared with the method shown in FIG. 2, this implementation manner is faster. However, whether an association relationship is updated in a timely manner determines accuracy of identifying the user equipment by the base station, and therefore this implementation manner has a relatively high requirement for time validity of the association relationship.

[0040] In another possible implementation manner of this embodiment of the present invention, in a case in which the retransmission identification parameter is a feedback status of a user terminal for actively retransmitted data, a method for determining a retransmission identification capability corresponding to a device identifier of user equipment is provided; as shown in FIG. 4, the method includes the following steps:

401. Send, within a rated transmission interval after initial transmission, retransmitted data to user equipment for at least once by using an HARQ process that is the same as an HARQ process in which initially transmitted data is located.

402. Collect a feedback status of a user terminal in a terminal receiving status feedback period that is after the retransmitted data is sent.

In this embodiment, the terminal receiving status feedback period that is after the retransmitted data is sent refers to a feedback period of a state, namely, the user terminal needs to feed back whether data actively retransmitted by a base station is received, and a function of the terminal receiving status feedback period that is after the retransmitted data is sent is similar to a function of a status feedback period that is after data is initially transmitted and that is specified in a standard protocol in the art.

403. Determine, according to the feedback status of the user terminal, whether the user equipment can identify the retransmitted data that belongs to the same HARQ process as the initially transmitted data and that is in the rated transmission interval following receiving of the initially transmitted data.

404. If the feedback status of the user terminal is DTX (Discontinuous Transmission, discontinuous transmission), determine that the user equipment cannot identify the retransmitted data that belongs to the same HARQ process as the initially transmitted data and that is in the rated transmission interval following the receiving of the initially transmitted data.

405. If the feedback status of the user terminal is a receiving success ACK or a receiving failure NACK, determine that the user equipment can identify the retransmitted data that belongs to the same HARQ process as the initially transmitted data and that is in the rated transmission interval following the receiving of the initially transmitted data. In this embodiment, the feedback status of the user terminal relates to three types that include DTX, ACK, and NACK, where the DTX indicates that the user terminal does not send any information to the base station in the terminal receiving status feedback period that is after the retransmitted data is sent, which may indicate that the user terminal totally does not identify that the base station has actively retransmitted data; the ACK indicates that the user terminal successfully receives the data actively retransmitted by the base station, the NACK indicates that the user terminal detects the data actively retransmitted by the base station but fails to receive the data, and the two states of the ACK and the NACK indicate that the user ter-

minal identifies the data actively retransmitted by the base station.

[0041] In this implementation manner, a base station tries to directly perform active retransmission on a user, and whether a user terminal has a capability to identify data actively retransmitted by the base station is determined according to a feedback result of the user terminal. Compared with the methods shown in FIG. 2 and FIG. 3, there are fewer changes on a network side and this implementation manner is easier to implement. In another possible implementation manner of this embodiment of the present invention, for a case in which it is determined that the user equipment cannot identify the retransmitted data that belongs to the same HARQ process as the initially transmitted data and that is in the rated transmission interval following the receiving of the initially transmitted data, this embodiment may be implemented by using a method of providing a selective gain for the user equipment; as shown in FIG. 5, the method includes the following step:

501. Send, within the rated transmission interval after initial transmission, the initially transmitted data for at least once by using another HARQ process that is different from the HARQ process in which the initially transmitted data is located.

[0042] In this implementation manner, for user equipment that cannot identify retransmitted data that is in a same HARQ process, a technical means of transmitting same data by using different HARQ processes is selected and used. An HARQ combination gain is replaced with a selective combination gain, which improves, to some extent, accuracy of receiving, by the user equipment, data sent by a base station, so that a relatively remote position covered by a cell can still quickly obtain information about the base station, thereby preventing, to some extent, a case of call drop caused by hard handover and further improving a cell capacity.

[0043] With reference to the method procedure shown in FIG. 5, different retransmission times are further limited in this embodiment of the present invention, including:

in a case in which data is retransmitted for only once: if the initially transmitted data is sent, within the rated transmission interval after the initial transmission, for only once by using the another HARQ process that is different from the HARQ process in which the initially transmitted data is located, retransmitted data at this time is sent, within the rated transmission interval after the initial transmission, by using the another HARQ process that is different from the HARQ process in which the initially transmitted data is located; and

in a case in which the data is retransmitted for several times: if the initially transmitted data is sent, within the rated transmission interval after the initial transmission, for at least twice by using the another HARQ process that is different from the HARQ process in which the initially transmitted data is located, the initially retransmitted data is resent, within the rated transmission interval after the initial transmission, for the first time by using the another HARQ process that is different from the HARQ process in which the initially transmitted data is located, and the initially transmitted data is resent for the $(N+1)^{th}$ time by using still another HARQ process that is different from the HARQ process in which the initially transmitted data is located and HARQ processes in which retransmitted data retransmitted for the first N times is located, where N is an integer greater than 1.

[0044] In this implementation manner, each time when retransmission is performed, different processes are used, to ensure that user equipment can receive data and perform identification on all the received data, which effectively improves a combination gain. In addition, it should be noted that, in consideration of a case in which a signal receiving status of the user equipment is fine, active retransmission or actively repeated sending performed by a base station may cause waste of HSDPA air interface resources. Therefore, a network side needs to identify when a NodeB active retransmission technology scenario and a NodeB actively repeated sending scenario appear, so that a corresponding data sending mechanism is used subsequently for user equipment that is in these scenarios. Specifically, in a determining process, the network side may determine, according to a change in user channel quality, a data service type, whether user equipment is in a handover state, and the like, whether the user is in a scenario in which a NodeB active retransmission technology needs to be used and the NodeB actively repeated sending scenario.

[0045] An embodiment of the present invention further provides a data transmission control apparatus, which may be used to implement method procedures shown in FIG. 1 to FIG. 5, and is mainly applied to a processor, a memory, and a transceiver that are of a base station, where except a communication module that is used for communication with user equipment or another network side device and that is integrated on the transceiver, and a memory function module that is integrated on the memory, all other function modules can be directly integrated on the processor. A structure of the apparatus is specifically shown in FIG. 6, and the apparatus includes:

an acquiring unit 61, configured to acquire a retransmission identification parameter of user equipment;
a determining unit 62, configured to determine, according to the retransmission identification parameter, whether the user equipment can identify retransmitted data that belongs to a same HARQ process as initially transmitted data and that is in a rated transmission interval following receiving of the initially transmitted data; and a transmitting unit 63,

configured to: when the user equipment can identify the retransmitted data that belongs to the same hybrid automatic repeat HARQ process as the initially transmitted data and that is in the rated transmission interval following the receiving of the initially transmitted data, send, within the rated transmission interval after initial transmission, the retransmitted data to the user equipment for at least once by using an HARQ process that is the same as the HARQ process in which the initially transmitted data is located.

[0046] Optionally, the acquiring unit 61 is specifically configured to: when the retransmission identification parameter is identification information of a retransmission identification capability, acquire identification information of a retransmission identification capability of the user equipment, where the identification information of the retransmission identification capability is used to indicate whether the user equipment can identify the retransmitted data that belongs to the same HARQ process as the initially transmitted data and that is in the rated transmission interval following the receiving of the initially transmitted data.

[0047] The determining unit 62 is specifically configured to: when the identification information of the retransmission identification capability indicates that the user equipment can identify the retransmitted data that belongs to the same HARQ process as the initially transmitted data and that is in the rated transmission interval following the receiving of the initially transmitted data, determine that the user equipment can identify the retransmitted data that belongs to the same HARQ process as the initially transmitted data and that is in the rated transmission interval following the receiving of the initially transmitted data; or when the identification information of the retransmission identification capability indicates that the user equipment cannot identify the retransmitted data that belongs to the same HARQ process as the initially transmitted data and that is in the rated transmission interval following the receiving of the initially transmitted data, determine that the user equipment cannot identify the retransmitted data that belongs to the same HARQ process as the initially transmitted data and that is in the rated transmission interval following the receiving of the initially transmitted data.

[0048] Optionally, the acquiring unit 61 is further specifically configured to acquire a device identifier of the user equipment.

[0049] The determining unit 62 is further specifically configured to: determine, according to the device identifier of the user equipment and an association relationship between a device identifier and a retransmission identification capability, a retransmission identification capability corresponding to the device identifier of the user equipment; and if the retransmission identification capability corresponding to the device identifier of the user equipment is that the user equipment can identify the retransmitted data that belongs to the same HARQ process as the initially transmitted data and that is in the rated transmission interval following the receiving of the initially transmitted data, determine that the user equipment can identify the retransmitted data that belongs to the same HARQ process as the initially transmitted data and that is in the rated transmission interval following the receiving of the initially transmitted data; if the retransmission identification capability corresponding to the device identifier of the user equipment is that the user equipment cannot identify the retransmitted data that belongs to the same HARQ process as the initially transmitted data and that is in the rated transmission interval following the receiving of the initially transmitted data, determine that the user equipment cannot identify the retransmitted data that belongs to the same HARQ process as the initially transmitted data and that is in the rated transmission interval following the receiving of the initially transmitted data; or if the retransmission identification capability corresponding to the device identifier of the user equipment cannot be determined according to the association relationship between a device identifier and a retransmission identification capability, determine that the user equipment cannot identify the retransmitted data that belongs to the same HARQ process as the initially transmitted data and that is in the rated transmission interval following the receiving of the initially transmitted data.

[0050] Optionally, as shown in FIG. 7, the acquiring unit 61 further includes a transmitting module 611 and a collecting module 612.

[0051] The transmitting module 611 is configured to send, within the rated transmission interval after the initial transmission, the retransmitted data to the user equipment for at least once by using the HARQ process that is the same as the HARQ process in which the initially transmitted data is located.

[0052] The collecting module 612 is configured to collect a feedback status of a user terminal in a terminal receiving status feedback period that is after the retransmitted data is sent. The determining unit 62 is further configured to: determine, according to the feedback status of the user terminal, whether the user equipment can identify the retransmitted data that belongs to the same HARQ process as the initially transmitted data and that is in the rated transmission interval following the receiving of the initially transmitted data, where if the feedback status of the user terminal is discontinuous transmission DTX, the determining unit 62 determines that the user equipment cannot identify the retransmitted data that belongs to the same HARQ process as the initially transmitted data and that is in the rated transmission interval following the receiving of initially transmitted data; or if the feedback status of the user terminal is a receiving success ACK or a receiving failure NACK, the determining unit 62 determines that the user equipment can identify the retransmitted data that belongs to the same HARQ process as the initially transmitted data and that is in the rated transmission interval following the receiving of ini-

tially transmitted data.

[0053] Optionally, the transmitting unit 63 is further configured to: when it is determined that the user equipment cannot identify the retransmitted data that belongs to the same HARQ process as the initially transmitted data and that is in the rated transmission interval following the receiving of initially transmitted data, send, within the rated transmission interval after the initial transmission, the initially transmitted data for at least once by using another HARQ process that is different from the HARQ process in which the initially transmitted data is located.

[0054] Optionally, the transmitting unit 63 is further specifically configured to: when the initially transmitted data is sent, within the rated transmission interval after the initial transmission, for only once by using the another HARQ process that is different from the HARQ process in which the initially transmitted data is located, send, within the rated transmission interval after the initial transmission, the initially transmitted data by using the another HARQ process that is different from the HARQ process in which the initially transmitted data is located; or when the initially transmitted data is sent, within the rated transmission interval after the initial transmission, for at least twice by using the another HARQ process that is different from the HARQ process in which the initially transmitted data is located, resend, within the rated transmission interval after the initial transmission, the initially transmitted data for the first time by using the another HARQ process that is different from the HARQ process in which the initially transmitted data is located, and resend the initially transmitted data for the $(N+1)^{th}$ time by using still another HARQ process that is different from the HARQ process in which the initially transmitted data is located and HARQ processes in which retransmitted data retransmitted for the first N times is located, where N is an integer greater than 1. Optionally, the rated transmission interval is five TTIs or seven TTIs.

[0055] After determining that user equipment can identify data that is retransmitted for several times in a short period of time, the data transmission control apparatus provided in this embodiment of the present invention sends, within a rated transmission interval after initial transmission, retransmitted data to the user equipment for at least once by using an HARQ process that is the same as an HARQ process in which initially transmitted data is located, so that the user equipment can obtain, in the short period of time, a combination gain generated during data demodulation, which greatly improves accuracy of receiving, by the user equipment, data sent by a base station; therefore, a relatively remote position covered by a cell can still quickly obtain information about the base station, thereby preventing, to some extent, a case of call drop caused by hard handover and further improving a cell capacity.

[0056] Optionally, the acquiring unit is specifically configured to: when the retransmission identification parameter is information about a protocol version supported by the user equipment, acquire the information about the protocol version supported by the user equipment, where the information about the protocol version supported by the user equipment is used to indicate whether the user equipment can identify the retransmitted data that belongs to the same HARQ process as the initially transmitted data and that is in the rated transmission interval following the receiving of the initially transmitted data; the determining unit is specifically configured to: if the information about the protocol version supported by the user equipment indicates that the user equipment supports an updated protocol version, determine that the user equipment can identify the retransmitted data that belongs to the same HARQ process as the initially transmitted data and that is in the rated transmission interval following the receiving of the initially transmitted data; or if the information about the protocol version supported by the user equipment indicates that the user equipment does not support an updated protocol version, determine that the user equipment can identify the retransmitted data that belongs to the same HARQ process as the initially transmitted data and that is in the rated transmission interval following the receiving of the initially transmitted data. Optionally, the retransmission identification parameter is obtained by means of reporting by the user equipment in response to a requirement of a radio network controller, or the retransmission identification parameter is obtained by means of active reporting by the user equipment.

[0057] Optionally, the retransmission identification parameter is carried in Iub interface signaling between the radio network controller and a base station, or the retransmission identification parameter is carried in a high speed downlink shared channel data frame. Optionally, if the identification information of the retransmission identification capability indicates that the user equipment can identify the retransmitted data that belongs to the same HARQ process as the initially transmitted data and that is in the rated transmission interval following the receiving of the initially transmitted data, the apparatus sends, within the rated transmission interval after the initial transmission, the retransmitted data to the user equipment for at least once by using the HARQ process that is the same as the HARQ process in which the initially transmitted data is located; or if the identification information of the retransmission identification capability indicates that the user equipment cannot identify the retransmitted data that belongs to the same HARQ process as the initially transmitted data and that is in the rated transmission interval following the receiving of the initially transmitted data, the apparatus sends, within the rated transmission interval after the initial transmission, the initially transmitted data for at least once by using the another HARQ process that is different from the HARQ process in which the initially transmitted data is located. Optionally, the apparatus is the radio network controller, where the radio network controller carries indication information by using the high speed downlink shared channel data frame, and the indication information is used to indicate data that is

retransmitted to the user equipment in the data frame.

[0058] An embodiment of the present invention provides a base station, a structure of the base station is shown in FIG. 8, and the base station includes a processor 71, a memory 72, and a transceiver 73, where the memory 72 stores at least a computer program; the processor 71 is configured to invoke the program stored in the memory to control the transceiver 73, and is configured to implement method procedures shown in FIG. 1 to FIG. 5; the processor 71, the memory 72, and the transceiver 73 perform communication by using a bus. In addition, in an implementation process of the present invention, the processor 71 may be one or more processors, and the memory may also be built in the processor. Certainly, the processor and the memory are not necessarily components that are obviously physically separated.

[0059] The processor 71 is configured to: acquire a retransmission identification parameter of user equipment, and determine, according to the retransmission identification parameter, whether the user equipment can identify retransmitted data that belongs to a same HARQ process as initially transmitted data and that is in a rated transmission interval following receiving of the initially transmitted data.

[0060] The transceiver 72 is configured to: when it is determined that the user equipment can identify the retransmitted data, send, within the rated transmission interval after initial transmission, the retransmitted data to the user equipment for at least once by using an HARQ process that is the same as the HARQ process in which the initially transmitted data is located.

[0061] Optionally, the processor 71 is further specifically configured to: when the retransmission identification parameter is identification information of a retransmission identification capability, acquire identification information of a retransmission identification capability of the user equipment, where the identification information of the retransmission identification capability is used to indicate whether the user equipment can identify the retransmitted data that belongs to the same HARQ process as the initially transmitted data and that is in the rated transmission interval following the receiving of the initially transmitted data; and if the identification information of the retransmission identification capability indicates that the user equipment can identify the retransmitted data that belongs to the same HARQ process as the initially transmitted data and that is in the rated transmission interval following the receiving of the initially transmitted data, determine that the user equipment can identify the retransmitted data that belongs to the same HARQ process as the initially transmitted data and that is in the rated transmission interval following the receiving of the initially transmitted data; or if the identification information of the retransmission identification capability indicates that the user equipment cannot identify the retransmitted data that belongs to the same HARQ process as the initially transmitted data and that is in the rated transmission interval following the receiving of the initially transmitted data, determine that the user equipment cannot identify the retransmitted data that belongs to the same HARQ process as the initially transmitted data and that is in the rated transmission interval following the receiving of the initially transmitted data. Optionally, the processor 71 is further specifically configured to: when the retransmission identification parameter is a device identifier, acquire a device identifier of the user equipment; determine, according to the device identifier of the user equipment and an association relationship between a device identifier and a retransmission identification capability, a retransmission identification capability corresponding to the device identifier of the user equipment; and if the retransmission identification capability corresponding to the device identifier of the user equipment is that the user equipment can identify the retransmitted data that belongs to the same HARQ process as the initially transmitted data and that is in the rated transmission interval following the receiving of the initially transmitted data, determine that the user equipment can identify the retransmitted data that belongs to the same HARQ process as the initially transmitted data and that is in the rated transmission interval following the receiving of the initially transmitted data; if the retransmission identification capability corresponding to the device identifier of the user equipment is that the user equipment cannot identify the retransmitted data that belongs to the same HARQ process as the initially transmitted data and that is in the rated transmission interval following the receiving of the initially transmitted data, determine that the user equipment cannot identify the retransmitted data that belongs to the same HARQ process as the initially transmitted data and that is in the rated transmission interval following the receiving of the initially transmitted data; or if the retransmission identification capability corresponding to the device identifier of the user equipment cannot be determined according to the association relationship between a device identifier and a retransmission identification capability, determine that the user equipment cannot identify the retransmitted data that belongs to the same HARQ process as the initially transmitted data and that is in the rated transmission interval following the receiving of the initially transmitted data.

[0062] Optionally, the transceiver 73 is further configured to send, within the rated transmission interval after the initial transmission, the retransmitted data to the user equipment for at least once by using the HARQ process that is the same as the HARQ process in which the initially transmitted data is located.

[0063] The processor 71 is further configured to: collect a feedback status of a user terminal in a terminal receiving status feedback period that is after the retransmitted data is sent; and determine, according to the feedback status of the user terminal, whether the user equipment can identify the retransmitted data that belongs to the same HARQ process as the initially transmitted data and that is in the rated transmission interval following the re-

ceiving of the initially transmitted data, wherein if the feedback status of the user terminal is discontinuous transmission DTX, the processor 71 determines that the user equipment cannot identify the retransmitted data that belongs to the same HARQ process as the initially transmitted data and that is in the rated transmission interval following the receiving of initially transmitted data; or if the feedback status of the user terminal is a receiving success ACK or a receiving failure NACK, the processor 71 determines that the user equipment can identify the retransmitted data that belongs to the same HARQ process as the initially transmitted data and that is in the rated transmission interval following the receiving of initially transmitted data.

[0064] Optionally, the transceiver 73 is further specifically configured to: if it is determined that the user equipment cannot identify the retransmitted data that belongs to the same HARQ process as the initially transmitted data and that is in the rated transmission interval following the receiving of initially transmitted data, send, within the rated transmission interval after the initial transmission, the initially transmitted data for at least once by using another HARQ process that is different from the HARQ process in which the initially transmitted data is located.

[0065] Optionally, the transceiver 73 is further specifically configured to: if the initially transmitted data is sent, within the rated transmission interval after the initial transmission, for only once by using the another HARQ process that is different from the HARQ process in which the initially transmitted data is located, send, within the rated transmission interval after the initial transmission, the initially transmitted data by using the another HARQ process that is different from the HARQ process in which the initially transmitted data is located; or if the initially transmitted data is sent, within the rated transmission interval after the initial transmission, for at least twice by using the another HARQ process that is different from the HARQ process in which the initially transmitted data is located, resend, within the rated transmission interval after the initial transmission, the initially transmitted data for the first time by using the another HARQ process that is different from the HARQ process in which the initially transmitted data is located, and resend the initially transmitted data for the (N+1)th time by using still another HARQ process that is different from the HARQ process in which the initially transmitted data is located and HARQ processes in which retransmitted data retransmitted for the first N times is located, where N is an integer greater than 1. Optionally, the rated transmission interval is five TTIs or seven TTIs.

[0066] Optionally, the processor is further specifically configured to: when the retransmission identification parameter is information about a protocol version supported by the user equipment, acquire the information about the protocol version supported by the user equipment, where the information about the protocol version supported by the user equipment is used to indicate whether the user equipment can identify the retransmitted data that belongs to the same HARQ process as the initially transmitted data and that is in the rated transmission interval following the receiving of the initially transmitted data; and if the information about the protocol version supported by the user equipment indicates that the user equipment supports an updated protocol version, determine that the user equipment can identify the retransmitted data that belongs to the same HARQ process as the initially transmitted data and that is in the rated transmission interval following the receiving of the initially transmitted data; or if the information about the protocol version supported by the user equipment indicates that the user equipment does not support an updated protocol version, determine that the user equipment can identify the retransmitted data that belongs to the same HARQ process as the initially transmitted data and that is in the rated transmission interval following the receiving of the initially transmitted data.

[0067] Optionally, the processor is further specifically configured to learn, according to indication information carried by a radio network controller by using a high speed downlink shared channel data frame, data that needs to be retransmitted to the user equipment in the data frame.

[0068] After determining that user equipment can identify data that is retransmitted for several times in a short period of time, the base station provided in this embodiment of the present invention sends, within a rated transmission interval after initial transmission, retransmitted data to the user equipment for at least once by using an HARQ process that is the same as an HARQ process in which initially transmitted data is located, so that the user equipment can obtain, in the short period of time, a combination gain generated during data demodulation, which greatly improves accuracy of receiving, by the user equipment, data sent by the base station; therefore, a relatively remote position covered by a cell can still quickly obtain information about the base station, thereby preventing, to some extent, a case of call drop caused by hard handover and further improving a cell capacity.

[0069] In the embodiments of the present invention, optionally, a process in which a network side acquires a retransmission identification parameter of user equipment or identification information of a retransmission identification capability of user equipment may be implemented in a manner in which a radio network controller (Radio controller Controller, RNC) requests the user equipment to report the retransmission identification parameter or the identification information of the retransmission identification capability, for example, the radio network controller (Radio controller Controller, RNC) determines, according to information that is about a protocol version supported by the user equipment and is actively reported by the user equipment, whether the user equipment can identify retransmitted data that belongs to a same HARQ process as initially transmitted data and that is in a rated transmission interval following receiving of the initially transmitted data, so as to determine whether

the user equipment supports active retransmission. Specifically, for a terminal that supports an updated protocol version, it is determined that the terminal supports active retransmission; otherwise, it is determined that the terminal does not support active retransmission. Then, the RNC notifies a base station by using Iub interface signaling between the RNC and a NodeB, where the Iub interface signaling may include the retransmission identification parameter or the identification information of the retransmission identification capability that is used to indicate whether the user equipment supports an active retransmission technology, and the Iub interface signaling is used to instruct the base station to learn whether the user equipment supports the active retransmission technology; optionally, the RNC may also carry information about the retransmission identification capability of the user equipment in a high speed downlink shared channel (High-Speed Downlink Shared Channel, HS-DSCH) data frame, so that the base station learns whether the user equipment supports network side active retransmission, which is equivalent to that the base station obtains the retransmission identification parameter or the identification information of the retransmission identification capability.

[0070] The RNC may also send a request to the user equipment to request the user equipment to report a capability status indicating whether the user equipment supports active retransmission, for example, request the user equipment to report a status indicating whether a new protocol version is supported, so as to determine whether the user equipment can identify the retransmitted data that belongs to the same HARQ process as the initially transmitted data and that is in the rated transmission interval following the receiving of the initially transmitted data, and then the RNC may determine whether the user equipment supports active retransmission. Then the RNC notifies the base station by using the Iub interface signaling between the RNC and the base station, where the Iub interface signaling may include the retransmission identification parameter or the identification information of the retransmission identification capability that is used to indicate whether the user equipment supports the active retransmission technology, and the Iub interface signaling is used to instruct the base station to learn whether the user equipment supports the active retransmission technology; optionally, after receiving the capability status that indicates whether the user equipment supports retransmission and that is reported by the user equipment, for example, a status indicating whether the user equipment supports a protocol version, the RNC may also send the capability status to the base station by using the Iub interface signaling, and the base station determines the capability status indicating whether the user equipment supports retransmission. Specifically, for example, when it is determined whether the user equipment can identify the retransmitted data that belongs to the same HARQ process as the initially transmitted data and that is in the rated transmission interval following the receiving of the initially transmitted data, it is equivalent to that the base station obtains the retransmission identification parameter or the identification information of the retransmission identification capability of the user equipment.

[0071] If the user equipment has the retransmission identification capability but does not report the capability status, or the user equipment cannot report the capability status due to lack of the retransmission identification capability, it may be considered that the retransmission identification parameter or the identification information of the retransmission identification capability of the user equipment cannot be acquired.

[0072] A network device, such as a NodeB or an RNC, may independently or collaboratively control whether to send data to user equipment by using an active retransmission technology or an actively repeated sending technology.

[0073] Data retransmission controlled by the RNC (by using the active retransmission technology or the actively repeated sending technology) may include:

carrying, by the RNC, indication information by using the high speed downlink shared channel (High-Speed Downlink Shared Channel, HS-DSCH) data frame, where the indication information is used to indicate data that is in the data frame and that specifically needs to be sent to the user equipment by using the active retransmission technology or the actively repeated sending technology.

[0074] In the foregoing embodiments of the present invention:

that retransmitted data is sent, within a rated transmission interval after initial transmission, to user equipment for at least once by using an HARQ process that is the same as an HARQ process in which initially transmitted data is located may be referred to as an active retransmission technology, and that the initially transmitted data is sent, within the rated transmission interval after the initial transmission, for at least once by using another HARQ process that is different from the HARQ process in which initially transmitted data is located may be referred to as an actively repeated sending technology.

[0075] In the foregoing embodiments of the present invention, identification information of a retransmission identification capability may be a type of retransmission identification parameter. Based on the foregoing descriptions of the implementation manners, a person skilled in the art may clearly understand that the present invention may be implemented by software in addition to necessary universal hardware or by hardware only. In most circumstances, the former is a preferred implementation manner. Based on such an understanding, the technical solutions of the present invention essentially or the part

contributing to the prior art may be implemented in a form of a software product. The computer software product is stored in a readable storage medium, such as a floppy disk, a hard disk or an optical disc of a computer, and includes several instructions for instructing a computer device (which may be a personal computer, a server, or a network device) to perform the methods described in the embodiments of the present invention.

[0076] The foregoing descriptions are merely specific implementation manners of the present invention, but are not intended to limit the protection scope of the present invention. Any variation or replacement readily figured out by a person skilled in the art within the technical scope disclosed in the present invention shall fall within the protection scope of the present invention. Therefore, the protection scope of the present invention shall be subject to the protection scope of the claims.

Claims

1. A data transmission control method, comprising:

acquiring a retransmission identification parameter of user equipment;
determining, according to the retransmission identification parameter, whether the user equipment can identify retransmitted data that belongs to a same hybrid automatic repeat HARQ process as initially transmitted data and that is in a rated transmission interval following receiving of the initially transmitted data; and
if it is determined that the user equipment can identify the retransmitted data that belongs to the same hybrid automatic repeat HARQ process as the initially transmitted data and that is in the rated transmission interval following the receiving of the initially transmitted data, sending, within the rated transmission interval after initial transmission, the retransmitted data to the user equipment for at least once by using an HARQ process that is the same as the HARQ process in which the initially transmitted data is located.

2. The method according to claim 1, wherein when the retransmission identification parameter is identification information of a retransmission identification capability, the acquiring a retransmission identification parameter of user equipment comprises:

acquiring identification information of a retransmission identification capability of the user equipment, wherein the identification information of the retransmission identification capability is used to indicate whether the user equipment can identify the retransmitted data that belongs to the same HARQ process as the initially transmitted data and that is in the rated transmission interval following the receiving of the initially transmitted data; and
the determining, according to the retransmission identification parameter, whether the user equipment can identify retransmitted data that belongs to a same HARQ process as initially transmitted data and that is in a rated transmission interval following receiving of the initially transmitted data comprises:

if the identification information of the retransmission identification capability indicates that the user equipment can identify the retransmitted data that belongs to the same HARQ process as the initially transmitted data and that is in the rated transmission interval following the receiving of the initially transmitted data, determining that the user equipment can identify the retransmitted data that belongs to the same HARQ process as the initially transmitted data and that is in the rated transmission interval following the receiving of the initially transmitted data; or
if the identification information of the retransmission identification capability indicates that the user equipment cannot identify the retransmitted data that belongs to the same HARQ process as the initially transmitted data and that is in the rated transmission interval following the receiving of the initially transmitted data, determining that the user equipment cannot identify the retransmitted data that belongs to the same HARQ process as the initially transmitted data and that is in the rated transmission interval following the receiving of the initially transmitted data.

3. The method according to claim 1, wherein when the retransmission identification parameter is a device identifier, the acquiring a retransmission identification parameter of user equipment comprises:

acquiring a device identifier of the user equipment; and
the determining, according to the retransmission identification parameter, whether the user equipment can identify retransmitted data that belongs to a same HARQ process as initially transmitted data and that is in a rated transmission interval following receiving of the initially transmitted data comprises:

determining, according to the device identifier of the user equipment and an association relationship between a device identi-

fier and a retransmission identification capability, a retransmission identification capability corresponding to the device identifier of the user equipment; and

if the retransmission identification capability corresponding to the device identifier of the user equipment is that the user equipment can identify the retransmitted data that belongs to the same HARQ process as the initially transmitted data and that is in the rated transmission interval following the receiving of the initially transmitted data, determining that the user equipment can identify the retransmitted data that belongs to the same HARQ process as the initially transmitted data and that is in the rated transmission interval following the receiving of the initially transmitted data;

if the retransmission identification capability corresponding to the device identifier of the user equipment is that the user equipment cannot identify the retransmitted data that belongs to the same HARQ process as the initially transmitted data and that is in the rated transmission interval following the receiving of the initially transmitted data, determining that the user equipment cannot identify the retransmitted data that belongs to the same HARQ process as the initially transmitted data and that is in the rated transmission interval following the receiving of the initially transmitted data; or

if the retransmission identification capability corresponding to the device identifier of the user equipment cannot be determined according to the association relationship between a device identifier and a retransmission identification capability, determining that the user equipment cannot identify the retransmitted data that belongs to the same HARQ process as the initially transmitted data and that is in the rated transmission interval following the receiving of the initially transmitted data.

4. The method according to claim 1, wherein when the retransmission identification parameter is information about a protocol version supported by the user equipment, the acquiring a retransmission identification parameter of user equipment comprises:

determining, according to the information that is about the protocol version supported by the user equipment and is reported by the user equipment, whether the user equipment can identify the retransmitted data that belongs to the same HARQ process as the initially transmitted data and that is in the rated transmission interval following the receiving of initially transmitted data; and

the determining, according to the retransmission identification parameter, whether the user equipment can identify retransmitted data that belongs to a same HARQ process as initially transmitted data and that is in a rated transmission interval following receiving of the initially transmitted data comprises:

if the information about the protocol version supported by the user equipment indicates that the user equipment supports an updated protocol version, determining that the user equipment can identify the retransmitted data that belongs to the same HARQ process as the initially transmitted data and that is in the rated transmission interval following the receiving of the initially transmitted data; or if the information about the protocol version supported by the user equipment indicates that the user equipment does not support an updated protocol version, determining that the user equipment can identify the retransmitted data that belongs to the same HARQ process as the initially transmitted data and that is in the rated transmission interval following the receiving of the initially transmitted data.

5. The method according to claim 1, wherein when the retransmission identification parameter is a feedback status, the acquiring a retransmission identification parameter of user equipment comprises:

sending, within the rated transmission interval after the initial transmission, the retransmitted data to the user equipment for at least once by using the HARQ process that is the same as the HARQ process in which the initially transmitted data is located;

collecting a feedback status of a user terminal in a terminal receiving status feedback period that is after the retransmitted data is sent; and

the determining, according to the retransmission identification parameter, whether the user equipment can identify retransmitted data that belongs to a same HARQ process as initially transmitted data and that is in a rated transmission interval following receiving of the initially transmitted data comprises:

determining, according to the feedback status of the user terminal, whether the user equipment can identify the retransmitted data that belongs to the same HARQ process as the initially transmitted data and that is in the rated transmission interval following

the receiving of the initially transmitted data, wherein

if the feedback status of the user terminal is discontinuous transmission DTX, determining that the user equipment cannot identify the retransmitted data that belongs to the same HARQ process as the initially transmitted data and that is in the rated transmission interval following the receiving of initially transmitted data; or

if the feedback status of the user terminal is a receiving success ACK or a receiving failure NACK, determining that the user equipment can identify the retransmitted data that belongs to the same HARQ process as the initially transmitted data and that is in the rated transmission interval following the receiving of initially transmitted data.

6. The method according to any one of claims 1 to 5, further comprising:

if it is determined that the user equipment cannot identify the retransmitted data that belongs to the same HARQ process as the initially transmitted data and that is in the rated transmission interval following the receiving of initially transmitted data, sending, within the rated transmission interval after the initial transmission, the initially transmitted data for at least once by using another HARQ process that is different from the HARQ process in which the initially transmitted data is located.

7. The method according to claim 6, wherein the sending, within the rated transmission interval after the initial transmission, the initially transmitted data for at least once by using another HARQ process that is different from the HARQ process in which the initially transmitted data is located comprises:

if the initially transmitted data is sent, within the rated transmission interval after the initial transmission, for only once by using the another HARQ process that is different from the HARQ process in which the initially transmitted data is located, sending, within the rated transmission interval after the initial transmission, the initially transmitted data by using the another HARQ process that is different from the HARQ process in which the initially transmitted data is located; or

if the initially transmitted data is sent, within the rated transmission interval after the initial transmission, for at least twice by using the another HARQ process that is different from the HARQ process in which the initially transmitted data is located, resending, within the rated transmission interval after the initial transmission, the initially transmitted data for the first time by using the another HARQ process that is different from the HARQ process in which the initially transmitted data is located, and resending the initially transmitted data for the $(N+1)^{th}$ time by using still another HARQ process that is different from the HARQ process in which the initially transmitted data is located and HARQ processes in which retransmitted data retransmitted for the first N times is located, wherein N is an integer greater than 1.

8. The method according to any one of claims 1 to 5, further comprising that:

the retransmission identification parameter is obtained by means of reporting by the user equipment in response to a requirement of a radio network controller, or the retransmission identification parameter is obtained by means of active reporting by the user equipment.

9. The method according to any one of claims 1 to 8, further comprising that:

the retransmission identification parameter is carried in Iub interface signaling between the radio network controller and a base station, or the retransmission identification parameter is carried in a high speed downlink shared channel data frame.

10. The method according to any one of claims 1 to 5, further comprising:

if the identification information of the retransmission identification capability indicates that the user equipment can identify the retransmitted data that belongs to the same HARQ process as the initially transmitted data and that is in the rated transmission interval following the receiving of the initially transmitted data, sending, by a network side device within the rated transmission interval after the initial transmission, the retransmitted data to the user equipment for at least once by using the HARQ process that is the same as the HARQ process in which the initially transmitted data is located; or

if the identification information of the retransmission identification capability indicates that the user equipment cannot identify the retransmitted data that belongs to the same HARQ process as the initially transmitted data and that is in the rated transmission interval following the receiving of the initially transmitted data, sending, by a network side device within the rated transmission interval after the initial transmis-

sion, the initially transmitted data for at least once by using another HARQ process that is different from the HARQ process in which the initially transmitted data is located.

11. The method according to claim 10, further comprising that:

the network side device is a radio network controller, wherein the radio network controller carries indication information by using a high speed downlink shared channel data frame, and the indication information is used to indicate data that needs to be retransmitted to the user equipment in the data frame.

12. The method according to any one of claims 1 to 6, wherein the rated transmission interval is five transmission time intervals TTIs or seven TTIs.

13. A data transmission control apparatus, comprising:

an acquiring unit, configured to acquire a retransmission identification parameter of user equipment;
a determining unit, configured to determine, according to the retransmission identification parameter, whether the user equipment can identify retransmitted data that belongs to a same HARQ process as initially transmitted data and that is in a rated transmission interval following receiving of the initially transmitted data; and
a transmitting unit, configured to: when the user equipment can identify the retransmitted data that belongs to the same hybrid automatic repeat HARQ process as the initially transmitted data and that is in the rated transmission interval following the receiving of the initially transmitted data, send, within the rated transmission interval after initial transmission, the retransmitted data to the user equipment for at least once by using an HARQ process that is the same as the HARQ process in which the initially transmitted data is located.

14. The apparatus according to claim 13, wherein the acquiring unit is specifically configured to: when the retransmission identification parameter is identification information of a retransmission identification capability, acquire identification information of a retransmission identification capability of the user equipment, wherein the identification information of the retransmission identification capability is used to indicate whether the user equipment can identify the retransmitted data that belongs to the same HARQ process as the initially transmitted data and that is in the rated transmission interval following the receiving of the initially transmitted data; and

the determining unit is specifically configured to: when the identification information of the retransmission identification capability indicates that the user equipment can identify the retransmitted data that belongs to the same HARQ process as the initially transmitted data and that is in the rated transmission interval following the receiving of the initially transmitted data, determine that the user equipment can identify the retransmitted data that belongs to the same HARQ process as the initially transmitted data and that is in the rated transmission interval following the receiving of the initially transmitted data; or when the identification information of the retransmission identification capability indicates that the user equipment cannot identify the retransmitted data that belongs to the same HARQ process as the initially transmitted data and that is in the rated transmission interval following the receiving of the initially transmitted data, determine that the user equipment cannot identify the retransmitted data that belongs to the same HARQ process as the initially transmitted data and that is in the rated transmission interval following the receiving of the initially transmitted data.

15. The apparatus according to claim 13, wherein the acquiring unit is specifically configured to: when the retransmission identification parameter is information about a protocol version supported by the user equipment, acquire the information about the protocol version supported by the user equipment, wherein the information about the protocol version supported by the user equipment is used to indicate whether the user equipment can identify the retransmitted data that belongs to the same HARQ process as the initially transmitted data and that is in the rated transmission interval following the receiving of the initially transmitted data; and

the determining unit is specifically configured to: if the information about the protocol version supported by the user equipment indicates that the user equipment supports an updated protocol version, determine that the user equipment can identify the retransmitted data that belongs to the same HARQ process as the initially transmitted data and that is in the rated transmission interval following the receiving of the initially transmitted data; or if the information about the protocol version supported by the user equipment indicates that the user equipment does not support an updated protocol version, determine that the user equipment can identify the retransmitted data that belongs to the same HARQ process as the initially transmitted data and that is in the rated transmission interval following the receiving of the initially transmitted data.

16. The apparatus according to claim 14, wherein the acquiring unit is further specifically configured to acquire a device identifier of the user equipment; and

the determining unit is further specifically configured to: determine, according to the device identifier of the user equipment and an association relationship between a device identifier and a retransmission identification capability, a retransmission identification capability corresponding to the device identifier of the user equipment; and if the retransmission identification capability corresponding to the device identifier of the user equipment is that the user equipment can identify the retransmitted data that belongs to the same HARQ process as the initially transmitted data and that is in the rated transmission interval following the receiving of the initially transmitted data, determine that the user equipment can identify the retransmitted data that belongs to the same HARQ process as the initially transmitted data and that is in the rated transmission interval following the receiving of the initially transmitted data; if the retransmission identification capability corresponding to the device identifier of the user equipment is that the user equipment cannot identify the retransmitted data that belongs to the same HARQ process as the initially transmitted data and that is in the rated transmission interval following the receiving of the initially transmitted data, determine that the user equipment cannot identify the retransmitted data that belongs to the same HARQ process as the initially transmitted data and that is in the rated transmission interval following the receiving of the initially transmitted data; or if the retransmission identification capability corresponding to the device identifier of the user equipment cannot be determined according to the association relationship between a device identifier and a retransmission identification capability, determine that the user equipment cannot identify the retransmitted data that belongs to the same HARQ process as the initially transmitted data and that is in the rated transmission interval following the receiving of the initially transmitted data.

17. The apparatus according to claim 14, wherein the acquiring unit further comprises a transmitting module and a collecting module, wherein

the transmitting module is configured to send, within the rated transmission interval after the initial transmission, the retransmitted data to the user equipment for at least once by using the HARQ process that is the same as the HARQ process in which the initially transmitted data is located;

the collecting module is configured to collect a feedback status of a user terminal in a terminal receiving status feedback period that is after the retransmitted data is sent; and

the determining unit is further configured to: determine, according to the feedback status of the user terminal, whether the user equipment can identify the retransmitted data that belongs to the same HARQ process as the initially transmitted data and that is in the rated transmission interval following the receiving of the initially transmitted data, wherein if the feedback status of the user terminal is discontinuous transmission DTX, the determining unit determines that the user equipment cannot identify the retransmitted data that belongs to the same HARQ process as the initially transmitted data and that is in the rated transmission interval following the receiving of initially transmitted data; or if the feedback status of the user terminal is a receiving success ACK or a receiving failure NACK, the determining unit determines that the user equipment can identify the retransmitted data that belongs to the same HARQ process as the initially transmitted data and that is in the rated transmission interval following the receiving of initially transmitted data.

18. The apparatus according to any one of claims 14 to 17, wherein the transmitting unit is further configured to: when it is determined that the user equipment cannot identify the retransmitted data that belongs to the same HARQ process as the initially transmitted data and that is in the rated transmission interval following the receiving of initially transmitted data, send, within the rated transmission interval after the initial transmission, the initially transmitted data for at least once by using another HARQ process that is different from the HARQ process in which the initially transmitted data is located.

19. The apparatus according to claim 18, wherein the transmitting unit is further specifically configured to: when the initially transmitted data is sent, within the rated transmission interval after the initial transmission, for only once by using the another HARQ process that is different from the HARQ process in which the initially transmitted data is located, send, within the rated transmission interval after the initial transmission, the initially transmitted data by using the another HARQ process that is different from the HARQ process in which the initially transmitted data is located; or when the initially transmitted data is sent, within the rated transmission interval after the initial transmission, for at least twice by using the another HARQ process that is different from the HARQ process in which the initially transmitted data is located, resend, within the rated transmission interval after the initial transmission, the initially transmitted data for the first time by using the another HARQ process that is different from the HARQ process in which the initially transmitted data is located, and resend the initially transmitted data for the $(N+1)^{th}$ time by using still another HARQ process that is different from the HARQ process in which the initially transmitted data is located and HARQ processes in which retransmitted data retransmitted for the first N times is located, wherein N is an integer greater than 1.

20. The apparatus according to any one claims 13 to 19, wherein the retransmission identification parameter is obtained by means of reporting by the user equipment in response to a requirement of a radio network controller, or the retransmission identification parameter is obtained by means of active reporting by the user equipment.

21. The apparatus according to any one of claims 13 to 20, wherein the retransmission identification parameter is carried in Iub interface signaling between the radio network controller and a base station, or the retransmission identification parameter is carried in a high speed downlink shared channel data frame.

22. The apparatus according to any one of claims 13 to 21, wherein:

if the identification information of the retransmission identification capability indicates that the user equipment can identify the retransmitted data that belongs to the same HARQ process as the initially transmitted data and that is in the rated transmission interval following the receiving of the initially transmitted data, the apparatus sends, within the rated transmission interval after the initial transmission, the retransmitted data to the user equipment for at least once by using the HARQ process that is the same as the HARQ process in which the initially transmitted data is located; or

if the identification information of the retransmission identification capability indicates that the user equipment cannot identify the retransmitted data that belongs to the same HARQ process as the initially transmitted data and that is in the rated transmission interval following the receiving of the initially transmitted data, the apparatus sends, within the rated transmission interval after the initial transmission, the initially transmitted data for at least once by using the another HARQ process that is different from the HARQ process in which the initially transmitted data is located.

23. The apparatus according to any one of claims 13 to 22, wherein:

the apparatus is the radio network controller, wherein the radio network controller carries indication information by using the high speed downlink shared channel data frame, and the indication information is used to indicate data that is retransmitted to the user equipment in the data frame.

24. A base station, comprising a processor, a memory, and a transceiver; wherein the memory stores at least a computer program; the processor is configured to invoke the program stored in the memory, so as to control the transceiver; and the processor, the memory, and the transceiver perform communication by using a bus; wherein

the processor is configured to: acquire a retransmission identification parameter of user equipment, and determine, according to the retransmission identification parameter, whether the user equipment can identify retransmitted data that belongs to a same HARQ process as initially transmitted data and that is in a rated transmission interval following receiving of the initially transmitted data; and

the transceiver is configured to: when it is determined that the user equipment can identify the retransmitted data that belongs to the same hybrid automatic repeat HARQ process as the initially transmitted data and that is in the rated transmission interval following the receiving of the initially transmitted data, send, within the rated transmission interval after initial transmission, the retransmitted data to the user equipment for at least once by using an HARQ process that is the same as the HARQ process in which the initially transmitted data is located.

25. The base station according to claim 24, wherein the processor is further specifically configured to: when the retransmission identification parameter is identification information of a retransmission identification capability, acquire identification information of a retransmission identification capability of the user equipment, wherein the identification information of the retransmission identification capability is used to indicate whether the user equipment can identify the retransmitted data that belongs to the same HARQ process as the initially transmitted data and that is in the rated transmission interval following the receiving of the initially transmitted data; and if the identification information of the retransmission identification capability indicates that the user equipment can identify the retransmitted data that belongs to the same HARQ process as the initially transmitted data and that is in the rated transmission interval following the receiving of the initially transmitted data, determine that the user equipment can identify the retransmitted data that belongs to the same HARQ process as the initially transmitted data and that is in the rated transmission interval following the receiving of the initially transmitted data; or if the identification information of the retransmission identification capability indicates that the user equipment cannot identify the retransmitted data that belongs to the same HARQ process as the initially transmitted data and that is in the rated transmission interval following the receiving of the initially transmitted data, determine that the user equipment cannot identify the retransmitted data that belongs to the same HARQ process as the initially transmitted data and that is

in the rated transmission interval following the receiving of the initially transmitted data.

26. The base station according to claim 24, wherein the processor is further specifically configured to: when the retransmission identification parameter is a device identifier, acquire a device identifier of the user equipment; determine, according to the device identifier of the user equipment and an association relationship between a device identifier and a retransmission identification capability, a retransmission identification capability corresponding to the device identifier of the user equipment; and if the retransmission identification capability corresponding to the device identifier of the user equipment is that the user equipment can identify the retransmitted data that belongs to the same HARQ process as the initially transmitted data and that is in the rated transmission interval following the receiving of the initially transmitted data, determine that the user equipment can identify the retransmitted data that belongs to the same HARQ process as the initially transmitted data and that is in the rated transmission interval following the receiving of the initially transmitted data; if the retransmission identification capability corresponding to the device identifier of the user equipment is that the user equipment cannot identify the retransmitted data that belongs to the same HARQ process as the initially transmitted data and that is in the rated transmission interval following the receiving of the initially transmitted data, determine that the user equipment cannot identify the retransmitted data that belongs to the same HARQ process as the initially transmitted data and that is in the rated transmission interval following the receiving of the initially transmitted data; or if the retransmission identification capability corresponding to the device identifier of the user equipment cannot be determined according to the association relationship between a device identifier and a retransmission identification capability, determine that the user equipment cannot identify the retransmitted data that belongs to the same HARQ process as the initially transmitted data and that is in the rated transmission interval following the receiving of the initially transmitted data.

27. The base station according to claim 24, wherein the transceiver is further configured to send, within the rated transmission interval after the initial transmission, the retransmitted data to the user equipment for at least once by using the HARQ process that is the same as the HARQ process in which the initially transmitted data is located; and
the processor is further configured to: collect a feedback status of a user terminal in a terminal receiving status feedback period that is after the retransmitted data is sent; and determine, according to the feedback status of the user terminal, whether the user equipment can identify the retransmitted data that belongs to the same HARQ process as the initially transmitted data and that is in the rated transmission interval following the receiving of the initially transmitted data, wherein if the feedback status of the user terminal is discontinuous transmission DTX, the processor determines that the user equipment cannot identify the retransmitted data that belongs to the same HARQ process as the initially transmitted data and that is in the rated transmission interval following the receiving of initially transmitted data; or if the feedback status of the user terminal is a receiving success ACK or a receiving failure NACK, the processor determines that the user equipment can identify the retransmitted data that belongs to the same HARQ process as the initially transmitted data and that is in the rated transmission interval following the receiving of initially transmitted data.

28. The base station according to any one of claims 24 to 24, wherein the transceiver is further specifically configured to: if it is determined that the user equipment cannot identify the retransmitted data that belongs to the same HARQ process as the initially transmitted data and that is in the rated transmission interval following the receiving of initially transmitted data, send, within the rated transmission interval after the initial transmission, the initially transmitted data for at least once by using another HARQ process that is different from the HARQ process in which the initially transmitted data is located.

29. The method according to claim 28, wherein the transceiver is further specifically configured to: if the initially transmitted data is sent, within the rated transmission interval after the initial transmission, for only once by using the another HARQ process that is different from the HARQ process in which the initially transmitted data is located, send, within the rated transmission interval after the initial transmission, the initially transmitted data by using the another HARQ process that is different from the HARQ process in which the initially transmitted data is located; or if the initially transmitted data is sent, within the rated transmission interval after the initial transmission, for at least twice by using the another HARQ process that is different from the HARQ process in which the initially transmitted data is located, resend, within the rated transmission interval after the initial transmission, the initially transmitted data for the first time by using the another HARQ process that is different from the HARQ process in which the initially transmitted data is located, and resend the initially transmitted data for the $(N+1)^{th}$ time by using still another HARQ process that is different from the HARQ process in which the initially transmitted data is located and HARQ processes in which retransmit-

ted data retransmitted for the first N times is located, wherein N is an integer greater than 1.

30. The base station according to any one of claims 24 to 29, wherein:

the processor is further specifically configured to: when the retransmission identification parameter is information about a protocol version supported by the user equipment, acquire the information about the protocol version supported by the user equipment, wherein the information about the protocol version supported by the user equipment is used to indicate whether the user equipment can identify the retransmitted data that belongs to the same HARQ process as the initially transmitted data and that is in the rated transmission interval following the receiving of the initially transmitted data; and if the information about the protocol version supported by the user equipment indicates that the user equipment supports an updated protocol version, determine that the user equipment can identify the retransmitted data that belongs to the same HARQ process as the initially transmitted data and that is in the rated transmission interval following the receiving of the initially transmitted data; or if the information about the protocol version supported by the user equipment indicates that the user equipment does not support an updated protocol version, determine that the user equipment can identify the retransmitted data that belongs to the same HARQ process as the initially transmitted data and that is in the rated transmission interval following the receiving of the initially transmitted data.

31. The base station according to any one of claims 24 to 30, wherein:

the processor is further specifically configured to learn, according to indication information carried by a radio network controller by using a high speed downlink shared channel data frame, data that needs to be retransmitted to the user equipment in the data frame.

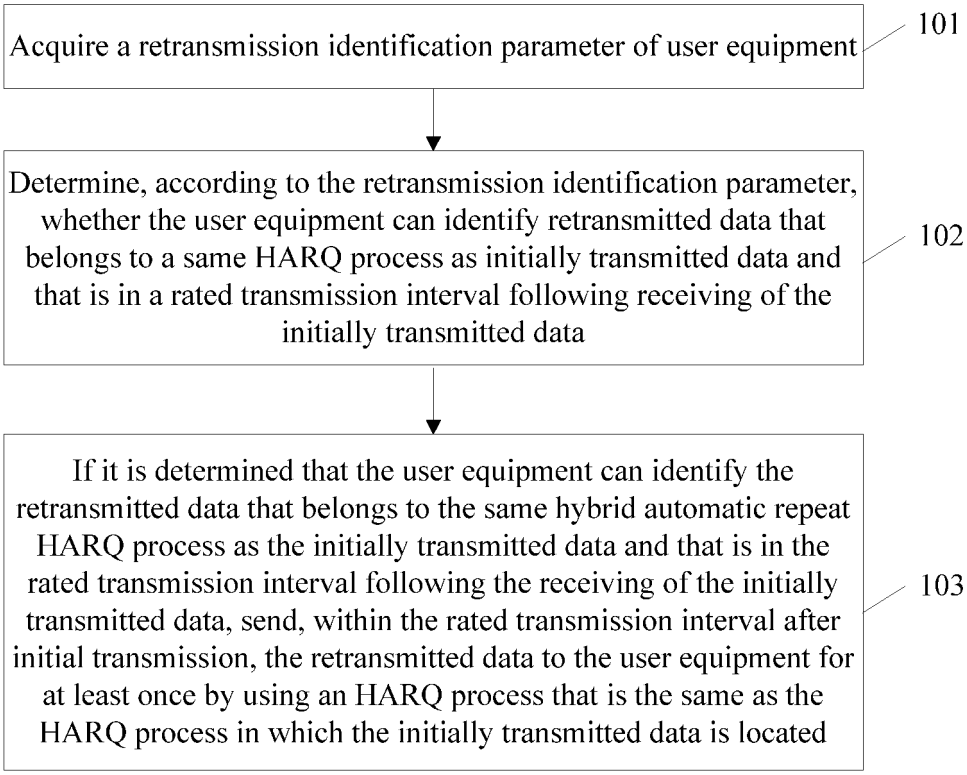
Acquire a retransmission identification parameter of user equipment
101
Determine, according to the retransmission identification parameter, whether the user equipment can identify retransmitted data that belongs to a same HARQ process as initially transmitted data and that is in a rated transmission interval following receiving of the initially transmitted data
102
If it is determined that the user equipment can identify the retransmitted data that belongs to the same hybrid automatic repeat HARQ process as the initially transmitted data and that is in the rated transmission interval following the receiving of the initially transmitted data, send, within the rated transmission interval after initial transmission, the retransmitted data to the user equipment for at least once by using an HARQ process that is the same as the HARQ process in which the initially transmitted data is located
103

FIG. 1

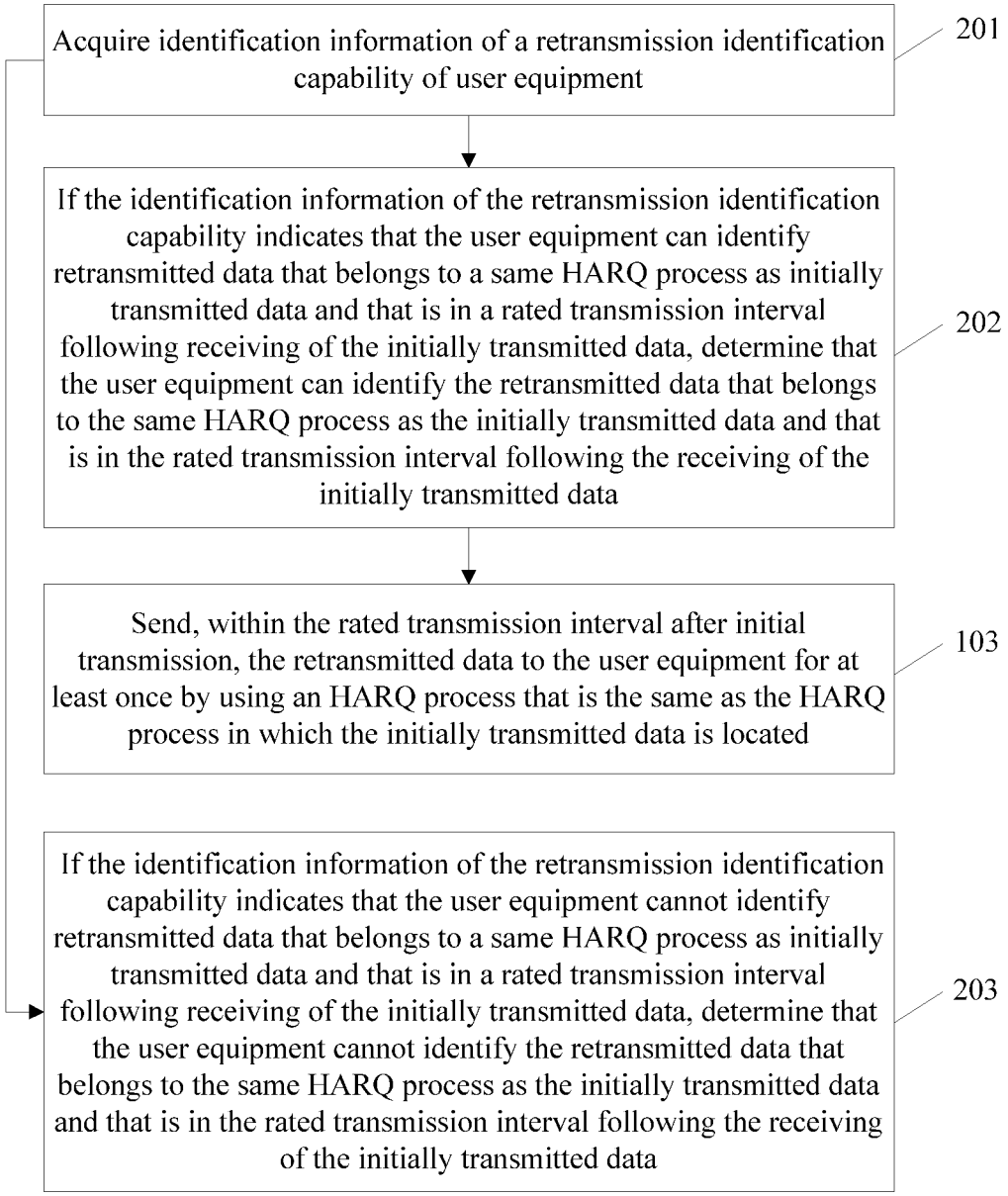
Acquire identification information of a retransmission identification capability of user equipment
201
If the identification information of the retransmission identification capability indicates that the user equipment can identify retransmitted data that belongs to a same HARQ process as initially transmitted data and that is in a rated transmission interval following receiving of the initially transmitted data, determine that the user equipment can identify the retransmitted data that belongs to the same HARQ process as the initially transmitted data and that is in the rated transmission interval following the receiving of the initially transmitted data
202
Send, within the rated transmission interval after initial transmission, the retransmitted data to the user equipment for at least once by using an HARQ process that is the same as the HARQ process in which the initially transmitted data is located
103
If the identification information of the retransmission identification capability indicates that the user equipment cannot identify retransmitted data that belongs to a same HARQ process as initially transmitted data and that is in a rated transmission interval following receiving of the initially transmitted data, determine that the user equipment cannot identify the retransmitted data that belongs to the same HARQ process as the initially transmitted data and that is in the rated transmission interval following the receiving of the initially transmitted data
203

FIG. 2

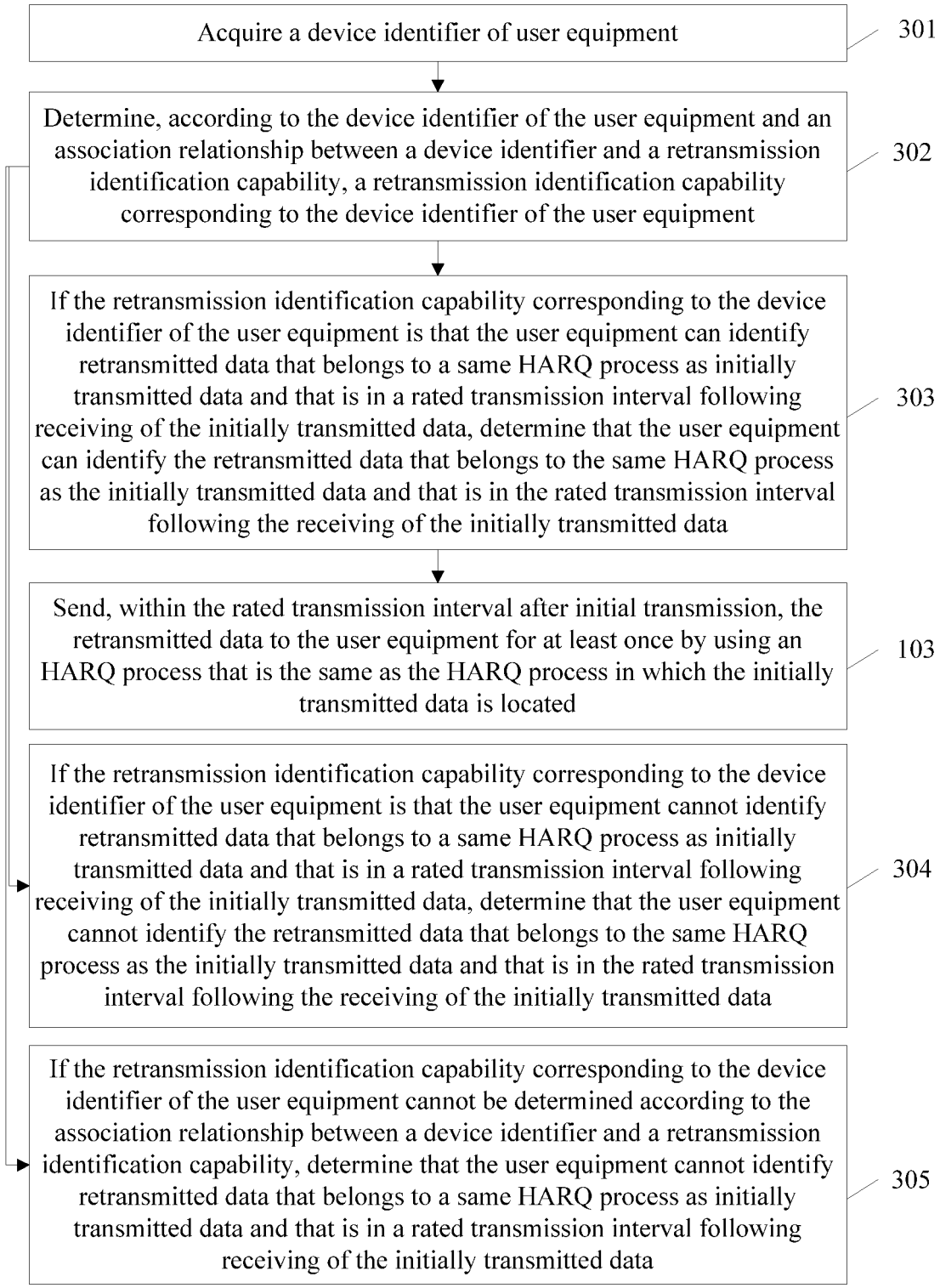
Acquire a device identifier of user equipment
301
Determine, according to the device identifier of the user equipment and an association relationship between a device identifier and a retransmission identification capability, a retransmission identification capability corresponding to the device identifier of the user equipment
302
If the retransmission identification capability corresponding to the device identifier of the user equipment is that the user equipment can identify retransmitted data that belongs to a same HARQ process as initially transmitted data and that is in a rated transmission interval following receiving of the initially transmitted data, determine that the user equipment can identify the retransmitted data that belongs to the same HARQ process as the initially transmitted data and that is in the rated transmission interval following the receiving of the initially transmitted data
303
Send, within the rated transmission interval after initial transmission, the retransmitted data to the user equipment for at least once by using an HARQ process that is the same as the HARQ process in which the initially transmitted data is located
103
If the retransmission identification capability corresponding to the device identifier of the user equipment is that the user equipment cannot identify retransmitted data that belongs to a same HARQ process as initially transmitted data and that is in a rated transmission interval following receiving of the initially transmitted data, determine that the user equipment cannot identify the retransmitted data that belongs to the same HARQ process as the initially transmitted data and that is in the rated transmission interval following the receiving of the initially transmitted data
304
If the retransmission identification capability corresponding to the device identifier of the user equipment cannot be determined according to the association relationship between a device identifier and a retransmission identification capability, determine that the user equipment cannot identify retransmitted data that belongs to a same HARQ process as initially transmitted data and that is in a rated transmission interval following receiving of the initially transmitted data
305

FIG. 3

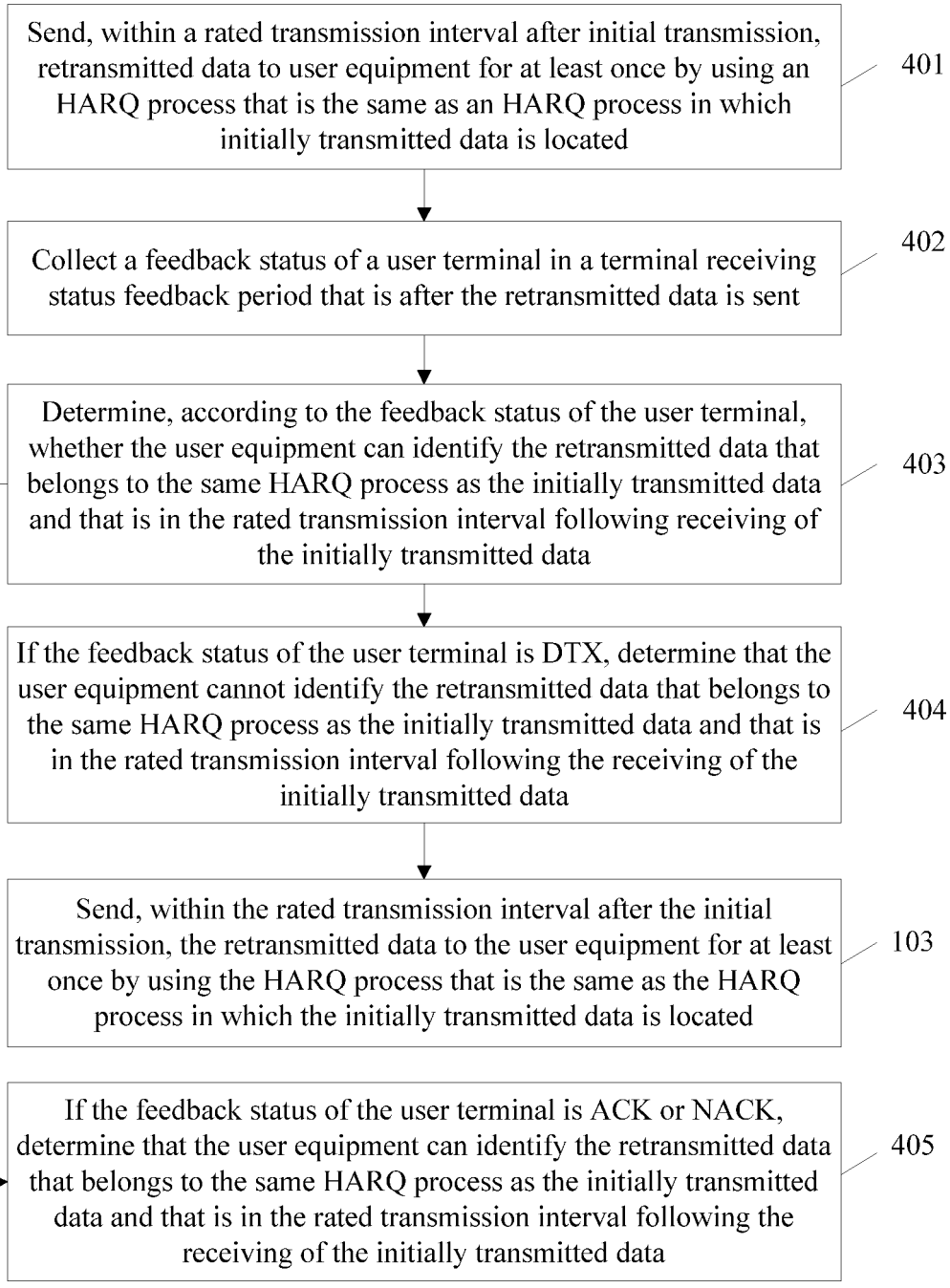
Send, within a rated transmission interval after initial transmission, retransmitted data to user equipment for at least once by using an HARQ process that is the same as an HARQ process in which initially transmitted data is located
401
Collect a feedback status of a user terminal in a terminal receiving status feedback period that is after the retransmitted data is sent
402
Determine, according to the feedback status of the user terminal, whether the user equipment can identify the retransmitted data that belongs to the same HARQ process as the initially transmitted data and that is in the rated transmission interval following receiving of the initially transmitted data
403
If the feedback status of the user terminal is DTX, determine that the user equipment cannot identify the retransmitted data that belongs to the same HARQ process as the initially transmitted data and that is in the rated transmission interval following the receiving of the initially transmitted data
404
Send, within the rated transmission interval after the initial transmission, the retransmitted data to the user equipment for at least once by using the HARQ process that is the same as the HARQ process in which the initially transmitted data is located
103
If the feedback status of the user terminal is ACK or NACK, determine that the user equipment can identify the retransmitted data that belongs to the same HARQ process as the initially transmitted data and that is in the rated transmission interval following the receiving of the initially transmitted data
405

FIG. 4

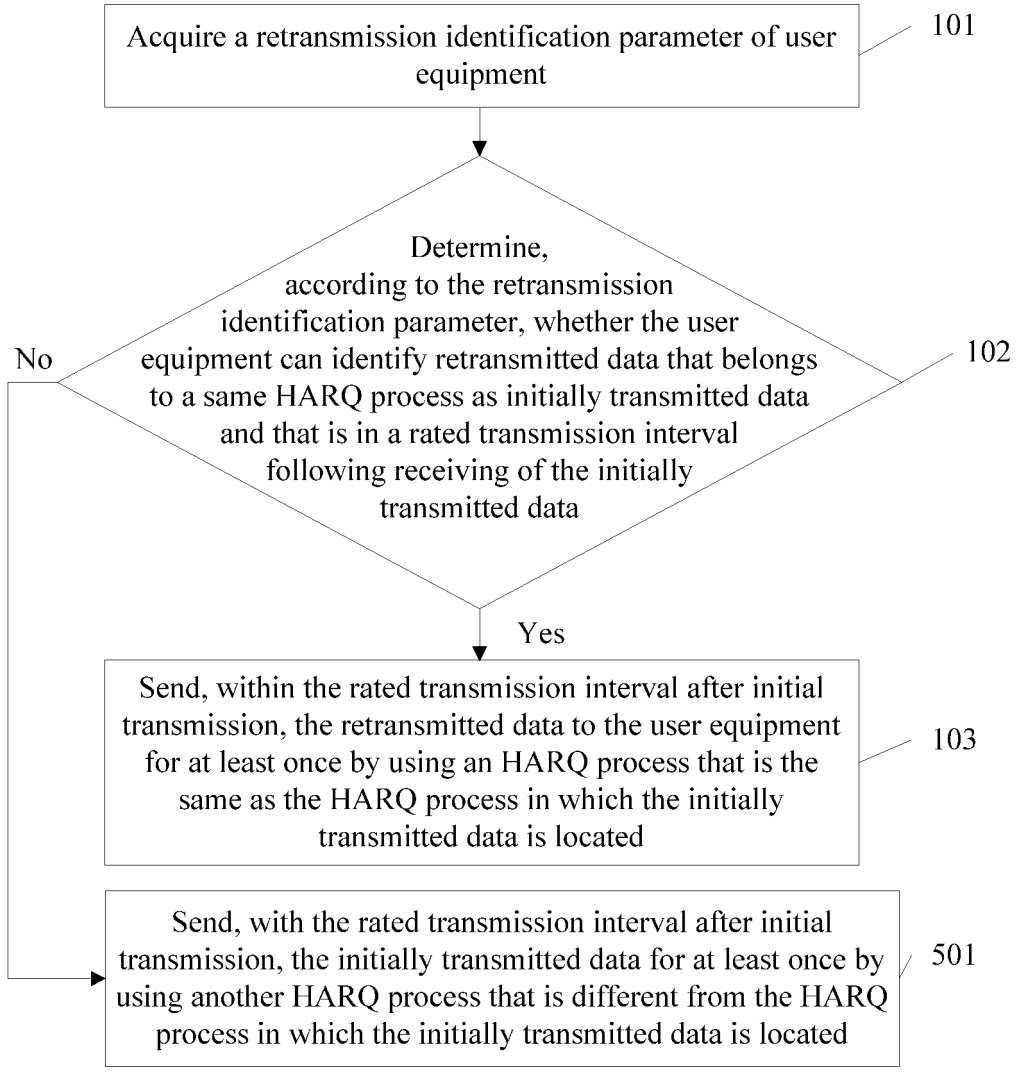
Acquire a retransmission identification parameter of user equipment
101
Determine, according to the retransmission identification parameter, whether the user equipment can identify retransmitted data that belongs to a same HARQ process as initially transmitted data and that is in a rated transmission interval following receiving of the initially transmitted data
102
No
Yes
Send, within the rated transmission interval after initial transmission, the retransmitted data to the user equipment for at least once by using an HARQ process that is the same as the HARQ process in which the initially transmitted data is located
103
Send, with the rated transmission interval after initial transmission, the initially transmitted data for at least once by using another HARQ process that is different from the HARQ process in which the initially transmitted data is located
501

FIG. 5

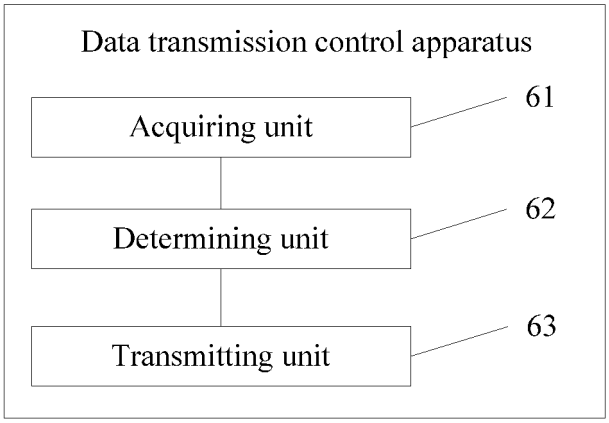

FIG. 6

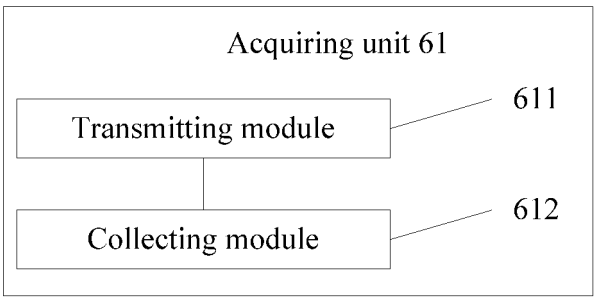

FIG. 7

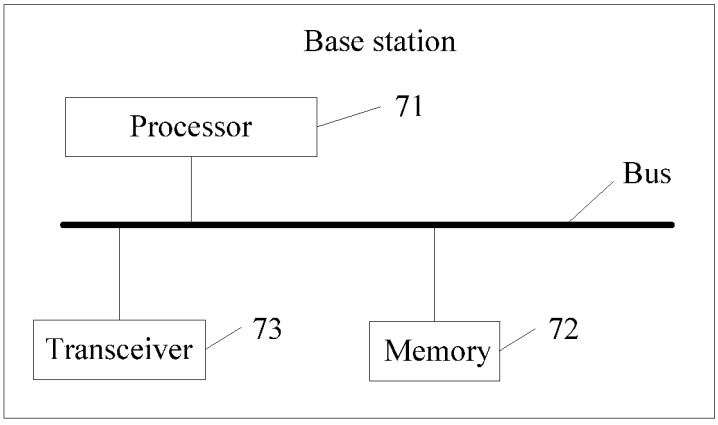

FIG. 8

INTERNATIONAL SEARCH REPORT

International application No.
PCT/CN2014/087454

A. CLASSIFICATION OF SUBJECT MATTER

H04L 29/06 (2006.01) i

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

H04L, H04Q, H04W

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)

CNKI, CNPAT, WPI, EPODOC: user equipment, user terminal, user, initial transmission, hybrid automatic repeat, HARQ, ARQ, distinguish, recognize, progress, re-transmit, retransmit, initial, new, same, UE

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	CN 101330721 A (ZTE CORP.), 24 December 2008 (24.12.2008), description, page 4, paragraph 3 to page 5, paragraph 4	1-31
A	CN 101562510 A (TD TECH LTD.), 21 October 2009 (21.10.2009), the whole document	1-31
A	CN 101651529 A (HUAWEI TECHNOLOGIES CO., LTD.), 17 February 2010 (17.02.2010), the whole document	1-31
A	EP 2080308 A2 (LG ELECTRONICS INC.), 22 July 2009 (22.07.2009), the whole document	1-31

☐ Further documents are listed in the continuation of Box C. ☒ See patent family annex.

* Special categories of cited documents:

"A" document defining the general state of the art which is not considered to be of particular relevance

"E" earlier application or patent but published on or after the international filing date

"L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)

"O" document referring to an oral disclosure, use, exhibition or other means

"P" document published prior to the international filing date but later than the priority date claimed

"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention

"X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone

"Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art

"&" document member of the same patent family

Date of the actual completion of the international search	Date of mailing of the international search report
16 March 2015 (16.03.2015)	**21 April 2015 (21.04.2015)**
Name and mailing address of the ISA/CN: State Intellectual Property Office of the P. R. China No. 6, Xitucheng Road, Jimenqiao Haidian District, Beijing 100088, China Facsimile No.: (86-10) 62019451	Authorized officer **LI, Xiaoli** Telephone No.: (86-10) **62414494**

Form PCT/ISA/210 (second sheet) (July 2009)

INTERNATIONAL SEARCH REPORT
Information on patent family members

International application No.
PCT/CN2014/087454

Patent Documents referred in the Report	Publication Date	Patent Family	Publication Date
CN 101330721 A	24 December 2008	None	
CN 101562510 A	21 October 2009	None	
CN 101651529 A	17 February 2010	None	
EP 2080308 A2	22 July 2009	BR PI0719540 A2	14 January 2014
		US 2010235705 A1	16 September 2010
		RU 2009110750 A	10 November 2010
		US 2010157916 A1	24 June 2010
		KR 20080030941 A	07 April 2008
		US 2010074211 A1	25 March 2010
		MX 2009003610 A	22 April 2009
		CN 103888229 A	25 June 2014
		CN 101611585 A	23 December 2009
		JP 2010502096 A	21 January 2010
		WO 2008041824 A2	10 April 2008
		JP 2012120182 A	21 June 2012
		IN KOLNP200900477 E	15 May 2009

Form PCT/ISA/210 (patent family annex) (July 2009)